

This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

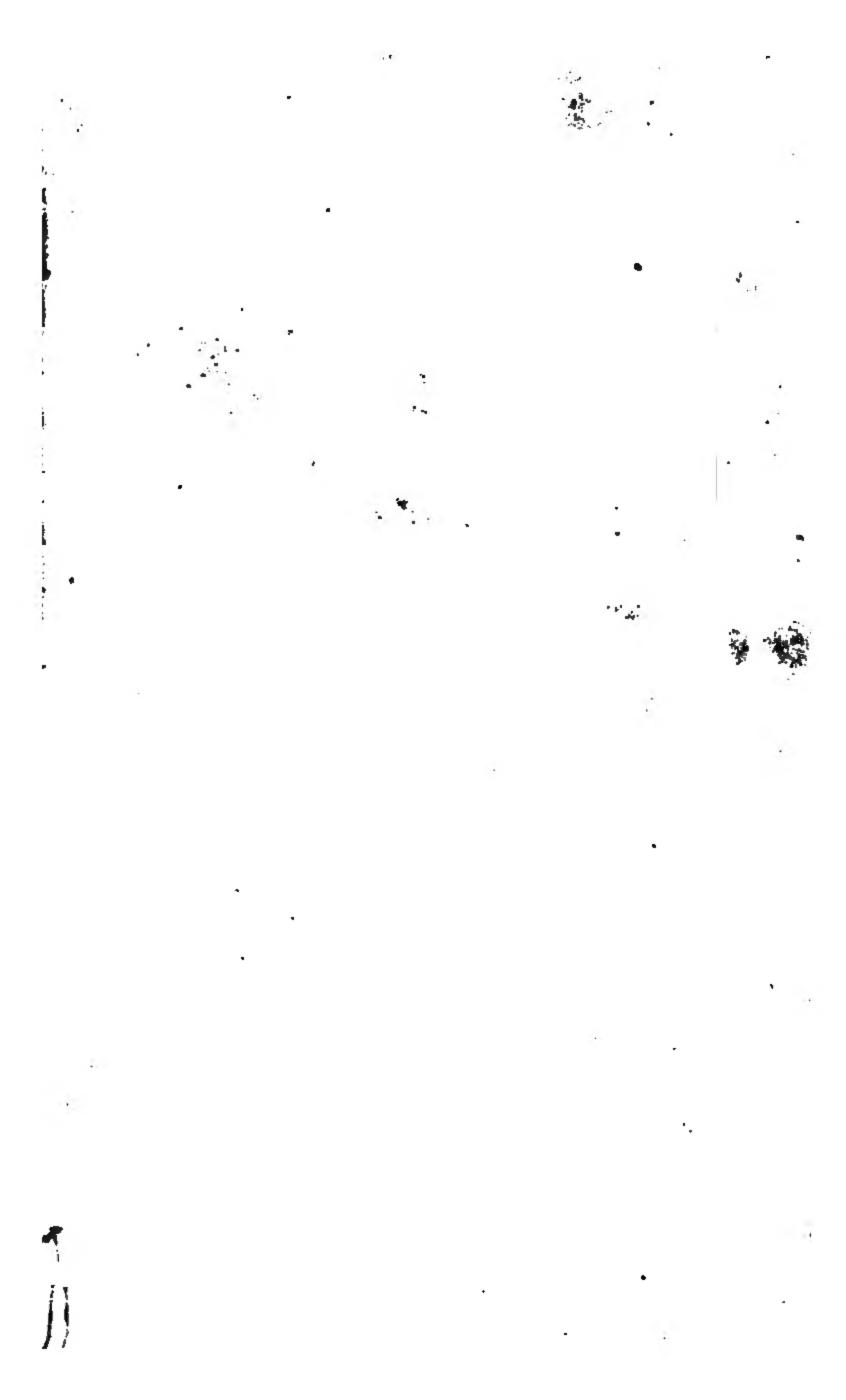
Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + Make non-commercial use of the files We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + Refrain from automated querying Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + Maintain attribution The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + Keep it legal Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at http://books.google.com/







		•		
		•		
	•			
•			•	
•				
		·		·
•				
		•		
•				
•				

THERAPEUTICS

AMD

MATERIA MEDICA.

Hoc sum contentus quod, etiamsi quomodo quidque fiat ignorem, quid fiat intelligo. . . . Quid scammoneæ radix ad purgandum, quid aristolochia ad morsus serpentum possit, video: quod satis est; cur possit nescio.

CICERO, De Divinatione.

7194 THERAPEUTICS

TMD

MATERIA MEDICA.

A SYSTEMATIC TREATISE

OF THE

ACTION AND USES OF MEDICINAL AGENTS,

IFOLUDING THEIR

DESCRIPTION AND HISTORY.

RY

ALFRED STILLÉ, M. D.,

PROPERSOR OF THE THEORY AND PRACTICE OF MEDICINE IN THE UNIVERSITY OF PRINCIPAL;

PELLOW OF THE COLLEGE OF PETGICIANS, AND MEMBER OF THE PATHOLOGICAL SOCIETY OF PRILADELPHIA;
MEMBER OF THE SOCIÉTÉ MÉDICALE D'OBSERVATION, OF PARIS;

HOSOBARY MEMBER OF THE MEDICAL SOCIETY OF THE STATE OF EMODE ISLAND, OF THE STATE OF HEW YORK, ETC.

SECOND EDITION, REVISED AND ENLARGED.

IN TWO VOLUMES.

VOL. II.

PRILADELPHIA:

BLANCHARD AND LEA.

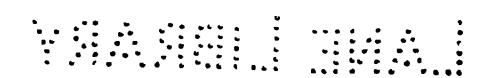
1864.



Entered according to the Act of Congress, in the year 1860, by BLANCHARD AND LEA,

in the Office of the Clerk of the District Court of the United States in and for the Eastern District of Pennsylvania.

PHILADELPHIA: COLLINS, PRINTER.



CONTENTS OF VOLUME II.

CLASS VI. (EREB	RO.	SPINAL	ST	IMULA	NTS	(Conti	inued)	•
									PAGI
Antispasmodics .	•	•	•	•	•	•	•	•	17
Assafœtida	•	•	•	•	•	•	•	•	24
Dracontium	•	•	•	•	•	•	•	•	30
Succinum.	•	•	•	•	•	•	•	•	31
Valeriana.	•	•	•	•	•	•	•	•	32
Castoreum	•	•	•	•	•	•	•	•	42
Moschus .	•	•	•	•	•	•	•	•	4:
Camphora.	•	•	•	•	•	•	•	•	51
Æther; Æther	Fortior	.•	•	•	•	•	•	•	73
Chloroformum '	Venale	•	•	•	•	•	•	•	103
Spiritus Æther	is Nitrosi	•	•	•	•	•	•	•	13
Cuprum Ammo	niatum	•	•	•	•	•	•	•	136
Zinci Oxidum	•	•	•	•	•	•	•	•	138
Zinci Valerians	.s •	•	•	•	•	•	•	•	147
SPINANTS IN GENERAL Nux Vomica	•	•	SPINAN	•	•	•	•	•	14: 14:
Faba Sancti Igr									158
. CLA	lss VI	II.	GENER	AL	SEDA	TIVE	ES.		
GENERAL SEDATIVES.	•	•	•	•	•	٠	•	•	159
Frigus .	•	•	•	•	•	•	•	•	160
Acidum Hydro						•	•	•	208
Potassii Cyanid	lum	•	•	•	•	•	•	•	21'
Acidum Citricu	m; Limo	nis	Succus	•	•	•	•	•	219
CL.	ass ix	- L.	ARTERI	AL	SEDAT	rive	S.		
ARTERIAL SEDATIVES II	GENERA	L.	•	•	•	•	•	•	223
Digitalis .		•	•	•	•	•	•	•	225 24

CLASS X. NERVOUS SEDATIVES.

NERVOUS SEDATIVES IN G.	eneral	•	•	•	•	•	•	· 25	
Aconiti Folium;	Aconiti	Radix			_		• _	. 25	9
Conium .	-	- Itauiz	•	•	•	•	•	. 26	
Cooculus .	_	•	•	•	•	•	•	. 27	
Lobelia .	•	•	•	. •	•	•	•	. 28	
Tabacum .	•	•	•	•	•	•	•	. 28	
Veratrum Album	•	•	•	•	•	•	•	. 30	
Sabadilla .	•	•	•	•	•	•	•	. 31	
basadana .	•	•	•	•	•	•	•	. 01	U
	CLAS	88 XI	. EV	ACUA	NTS.				
EVACUANTS IN GENERAL	•	• .	•	•	•	•	•	. 31	6
ERRHINES	•	•	•	•	•	•	•	. 32	1
Asarum .	•	•	•	•	•	•		. 32	1
Helenium Autum	nale	•	•	•	•	•	•	. 32	
			•	•	•	•	•	. 02	_
Exerics	•	•	•	•	•	•	•	. 32	2
Zinci Sulphas	•	•	•	•	•	•	•	. 33	5
Antimonii et Pots	issæ Tai	rtras	•	•	•	•	•	. 33	
Ipecacuanha	•	•	•	•	•	•	•	. 36	
Sanguinaria	•	•	•	•	•	•	•	. 37	
J									
CATHARTICS .	•	•	•	•	•	•	•	. 37	4
Sulphur Lotum;	Sulphu	- Sublin	natum	•	•	•	•	. 39	4
Magnesia .	•	•	•	•	•	•	•	. 40	0
Magnesiæ Carbon	88	•	•	•	•	•	•	. 40	2
Magnesiæ Sulpha	В	•	•	•	•	•	•	. 40	3
Sodæ Sulphas	• •	•	•	•	•	•	•	. 40	5
Potassæ Tartras	•	•	•	•	•	•	•	. 40	6
Potassæ Bitartras	•	•	•	•	•	•	•	. 400	6
Sodæ et Potassæ 7	Fartras	•	•	•	•	•	•	4()	8
Oleum Olivæ	•	•	•	•	•	•	•	. 409	9
Manna .	•	•	•	•	•	•	•	. 41	1
Cassia Fistula	•	•	•	•	•	•	•	. 41:	2
Tamarindus	•	•	•	•	•	•	•	. 413	3
Oleum Ricini	•	•	•	•	•	•	•	. 41	1
Senna .	•	•	•	•	•	•	•	. 41	9
Cassia Marilandic	a	•	•	•	•	•	•	. 42	1
Rheum .	•	•	•	•	•	•	•	. 42	2
Juglans .	•	•	•	•	•	•	•	. 42	7
Colocynthis	•	•	•	•	•	•	•	. 42'	7
Jalapa .	•	•	•	•	•	•	•	. 431	l
Scammonium	•	•	•	•	•	•	•	. 43	4
Gambogia.	•	•	•	•	•	•	•	. 430	
Aloe .	•	•	•	•	•	•	•	. 440)
Oleum Tiglii	•	•	•	•	•	•	•	. 417	7

		CONT	er Ka	O P	VOL.	II.				· vii
										PAGE
	Helleborus	• •	-	•	•	•	•	•	•	454
	Elaterium	•	•	•	•	•	•	•	•	458
	Podophyllum	•	•	•	•	•	•	•	•	461
Exper	TORANTS .			•						466
	Senega .								•	469
	Cimicifuga									472
	Allium .	•			•					474
			•		•					476
								•		478
	Balsamum Peruv	lanum								480
	Balsamum Tolut	anum								482
	Benzoinum									483
	Pix Liquida				·			-	·	486
_		-	•	•	-	٠	•	•	•	
DIAPH	ORETICS .	•	•	•	•	•	•	•	•	489
	Liquor Ammonia		ia	+	•	•	•	•	•	495
	Liquor Potasses C		•	•	•	4	•	•	•	498
		Nitrosi		•	•	•	•	•	•	499
			positu			•	•	•		501
		Guaia	ci Resi	oa.	•	•	•	•		502
		Cortex	•			•	•	•		505
	Serpentaria	•	•	•	٠	•	•	•	•	506
Dicke	rice .				•					508
	Potassæ Carbona	s : Pota	BBB Car	bona	s Pura	Potass	Blear	ропав		517
	Potassæ Nitras									519
	Potassæ Acetas									524
			•				•			527
		-								527
	Armoracia		-							528
	Scoparius .		•	•						530
	Scilla .		•	•	•	•	•	*	•	531
	Carota .	•	•	•	•	•	•	•	•	635
	Petroselinum		•	•	•	•	•	•	•	536
	Taraxacum	•	•	•	•	•	•	•	•	638
		· ····································	dana	•	•	•	•	•	•	540
	Erigeron; Eriger	OH CHES	idense	•	•	•	•	•	•	
	Buchu .	•	•	•	•	•	•	•	•	541
	Cva Ursi .	•	•	•	•	•	•	•	4	543
	Chimaphila	•	•	•	•	•	•	•	•	546
	Juniperns	•	•	•	•	•	•	•	•	547
	Oleum Cadinum	•	•	•	•	•	•	•	•	549
	Copaiba .	•	•	•	•	•	•	•	4	\$50
	Cubeba .	•	•	•				•	•	556
	Colchici Radix;	Colchici	Semen	١.	•	•	•	-	٠	561
Enmes	KAGOGUBS .				•					576
	Ergota .									580
	Gossypium; Gos	synii Ra	di≖			-	•		•	601
	Bubia Tinctorum		•							603

CONTENTS OF VOL. II.

Anthelmintics										PAGE 604
	•	•	•	•	•	•	•	•	•	
Mucuna	•	•	•	•	•	•	•	•	•	606
Stanni P		•	•	•	•	•	•	•	•	607
Filix Mas	3.	•	•	•	•	•	•	•	•	6 08
Chenopod	lium	•	•	•	•	•	•	•	•	611
Santonica	3.	•	•	•	•	•	•	•	•	613
Tanacetu	m	•	•	•	•	•	•	•	•	615
Granati 1	Fructûs	Corte	x; Gra	nati Ra	dicis Co	rtex	•	•	•	616
Absinthi	um	•	•	•	•	•	•	•	•	618
Brayer a	•	•	•	•	• ,	•	•	•	•	62 0
Spigeli a	•	•	•	•	•	•	•	•	•	623
Azedarac	h	•	•	•	•	•	•	•	•	624
Pepo	•	•	•	•	•	•	•	•	•	625
Kamela	•	•	•	•	•	•	•	•	•	627
. Saoria	•	•	•	•	•	•	•	•	•	628
Zatze	•	•	•	•	•	•	•	•	•	628
		CLA	SS X	II. A	LTER	ATIV	ES.			
Alteratives in	GENERA	L	•	•	•	•	•	•	•	629
Hydrarg	vrnm	_			_	•		•	•	633
Arsenicu		•	•	•	•	•	•	•	•	695
Iodinium		_	_	-				-	•	720
Oleum M		•	•	•	•	•	•	•	•	760
Potassæ			•	•	•	•	•	•	•	774
			•	•	•	•	•	•	•	783
Ammoni		8	•	•	•	•	•	•	•	
Barsapar	111 8	•	•	•	•	•	•	•	•	78 8

THERAPEUTICS

AND

MATERIA MEDICA.

ANTISPASMODICS.

ANTISPASMODICS are stimulant medicines which control spasm by their action upon the spinal marrow rather than upon the brain. Spasm is the abnormal involuntary contraction of muscular fibre. It may be tonic or clonic. Tonic contraction is permanent, clonic contraction implies alternate rigidity and relaxation of the affected muscles.

Three classes of spasmodic affections may be recognized, which arise from as many different kinds of causes.

First, and least directly related to our present subject, are those in which the blood contains a poisonous matter generated within the system, consisting of retained excreta, as in Bright's disease, idio-

pathic jaundice, &c.

Second, direct mechanical irritation of the nervous centres or cords, as in traumatic tetanus, gastro-intestinal and other derangements in remote organs, wounds and inflammation of the brain or spinal cord, mechanical irritation of these parts by injuries, effusions, tubercles, exostoses, and other tumors. To these may be added sudden congestion of the brain followed by exhaustion, as in violent paroxysms of passion.

Third, direct exhaustion of the system. Various causes may lead to this result. Physical fatigue produced by prolonged muscular exertion frequently occasions either general convulsions, or spasms (cramps) of those muscles which have been especially overtasked. The exhaustion following protracted mental excitement, or an intense strain of the feelings, operates in the same manner, and such is often the effect of depressing passions, of sexual excesses (in which a material loss is added to overwrought emotion), and, above all, of impover-ishment of the blood, whether produced by hemorrhage, by defective nutrition, or by an imperfect supply of the vital stimuli light and air. To these last-mentioned and indirect causes producing ansemia

VOL. II.—2

and the nervous diathesis must be added the influence of insufficient muscular exercise, and the simultaneous operation of agencies tending to over-stimulate, and therefore to exhaust, the nervous system.

All, or nearly all, of these causes abound in large cities, where the tainted atmosphere, the perpetual turmoil, the incessant activity of all the passions, and those especially which seek for gratification in luxury and ease, lower the tone of the system, blanch the skin, impair the blood, soften and waste the muscles, and at the same time so exalt the susceptibility of the nervous system that it shrinks from the impression of ordinary sensations, exaggerating, distorting, and misinterpreting them. The eye is averted from the light of day, which is shut out by delicately-tinted curtains; the ear dreads the harsh sounds of the working world, and carpets and tapestry deaden its echoes; intoxicating perfumes mask the noisome smells from surrounding decay; none but the softest and most delicate tissues and the most polished forms encounter the touch, and only the most dainty food invites the fastidious palate. Modern voluptuaries, like the ancient Sybarites, would fain forbid by law all noisy crafts, and let no cock survive to disturb their morning slumbers with his "shrill clarion." The imagination meanwhile dwells in fairy land, far away from the substantial glories of nature and their invigorating power, and the passions, finding none of the nobler objects which consecrate them in the battle of life, consume the body in the fire of sensual excesses. Thus, losing more and more of its power, the whole system gradually falls into the condition of a musical instrument that is out of tune, whose keys, when struck, no longer give harmonious notes, but only jangled and discordant sounds. To use the technical, but strongly expressive, phrase, it has lost its tone.

This word is even more significant here than in its application to that mere relaxation, without nervous disorder, which has been described as the peculiar subject of a tonic treatment. In that case there is a loss of power; in this there is a want of harmony in the functions, and an absence of the unity which in vital processes, as in all compound actions, is essential to strength. As might be expected, from the extreme susceptibility and mobility of her nervous system, woman much more frequently than man illustrates the laws by displaying the phenomena of spasmodic affections, whether this be owing to some radical difference in her general organization from that of man, or whether it depend upon the special organs which in so striking a manner distinguish her from the opposite sex. Certain it is that, even during the normal periodical activity of the generative function, the female exhibits a peculiar susceptibility to external impressions, and experiences internal sensations with a keenness of perception which is almost morbid. A step further, and we find many women who at ordinary times betray no symptom of deranged health, but at the menstrual epoch appear suddenly to have changed their nature; the unity and harmony of their system are broken up; each separate organ utters in its own language its peculiar cry of distress; sharp pains rack the head, the eyes refuse to bear the light, incessant buzzing or tingling noises distract the ears, spasms seize the throat and hinder

and harmonious so long, and only so long, as the tone of the system is strong enough to prevent or to repress the outbreaks of individual parts. Each leans upon the rest, and all combine to preserve and to enliven the organism; but no sooner does the moderating power of the nervous system relax, than their silent and consentaneous movements cease, and one or two, many or all the parts may be thrown into disordered action, which becomes the worse confounded and inextricable the longer it lasts. There is no greater marvel among the wonders of the living mechanism, than the noiseless ease with which its manifold functions are performed so long as perfect health continues. But for the cravings of hunger, or the calls of nature, the man of sound constitution would not suspect that there was within him a complex and surpassingly ingenious mechanism. Weakness immediately betrays the secret. No sooner is strength impaired than each organ begins, as it were, to make its individual presence and influence

felt, by its disordered movements, or by the voice of pain.

A simple reference to the first and third classes of the causes of functional spasmodic diseases which have been above enumerated, makes it plain that they are all of a depressing nature, whether they operate directly upon the nervous system through the mind, or indirectly through the blood and the function of nutrition. The second class of causes, on the other hand, comprises those which, while the organism maintains its normal vigor, excite spasm by their excessive irritation of the nervous system. In other words, spasm occurs when the power of resistance of the system is below the normal limits, although the excitant may not be excessive; and it is equally produced when the system retains all its vigor, if the excitant is greatly in excess of the normal degree. In the latter case it is evident that a treatment is called for which shall diminish the violence of the cause, if possible, and blunt the sensibility of the system to its impressions. In the former case, on the other hand, it is equally clear that the proper balance of the system is to be restored by infusing power into the nervous system, and thus bringing its parts again into harmonious action. The return of power to this system renews its tone, but its irritability at the same time declines; for the last-named quality is always in an inverse ratio to the former. This is indeed illustrated on a large scale by a comparison made between warm and cold-blooded animals. It is the former which display the least, and the latter which exhibit the greatest, degree of irritability; and, as is well known, these are. always selected as the subjects of experiments intended to illustrate the excito-motory function. Indeed, the muscular fibre of the frog forms one of the most delicate tests of the lower degrees of galvanic action. When the power which the brain possesses of regulating movement is withdrawn or impaired, excited, spinal, or convulsive actions occur under the influence of irritants which at other times would occasion no response in the muscular system. Hence it is that all spasmodic phenomena which are not directly the effect of mental influences occur most readily during sleep, and that in decapitated animals muscular spasm can be excited with the greatest facility.

Bearing in mind that two sorts of causes, alike in nature but opposite

a spasmodic derangement of the nervous system, and just in so far as it depends upon direct debility of this system, more than upon alterations in the constitution of the blood, will it be modified favorably by medicines of the present class. That is to say, when this state is developed in the course of such diseases affecting persons of a constitutionally nervous temperament, or who have become impressionable by loss of strength, or the operation of mental influences, antispasmodics will be more efficient in promoting recovery than where the ataxic phenomena depend more directly upon the gravity of the disease In such cases, that is, when ataxia grows out of adynamia resulting from profound changes in the blood, alcoholic stimulants are alone entitled to the physician's confidence. For the class of diseases now referred to, antispasmodic medicines are not as frequently used by the physicians of any other country as by those of Germany. Thus in Great Britain and Ireland, where typhus is endemic, these remedies appear to occupy a very secondary position, if any at all, in the treatment of this disease. But we are persuaded that by keeping in view the distinction above insisted upon, and limiting their administration to cases in which ataxia depends upon the patient's constitutional susceptibility, rather than upon the morbid changes in the blood, they will be found in many cases prompt and certain remedies.

But, as has so often been repeated, antispasmodics are principally adapted to the cure of diseases which are either primarily seated in the nervous system, or in which the extraneous cause of its disorder is inconsiderable when compared with the spasm which it produces. In the former, pure antispasmodics are frequently sufficient to effect a cure, or at least to dissipate the symptoms of the existing paroxysms; but in the latter it is usually necessary to combine with them narcotics, or to employ those agents of the present class which in full doses combine an antispasmodic with a narcotic power. Thus it is of little avail to administer valerian, camphor, musk, or assafcetida, to allay the agonizing spasms of the ureter in nephritic, and of the gall-ducts in biliary colic, or of the rigid uterus in parturition, while the most complete relief of pain, and an easy discharge of the distending body, are often secured by the appropriate administration of chloroform or ether.

The disorders which antispasmodics are peculiarly adapted to relieve are both general and local, and depend upon a morbid susceptibility of the whole nervous system, or upon an exaggerated excitability of some particular part. The former of these conditions has already been referred to as that which is most common in women and in men of a delicate and feminine organization, and is usually manifested by a morbidly acute condition of the senses, and a state of the mind which leads to the exaggeration or perversion of all external impressions and all internal sensations. In its highest degree this state merges into hysteria, or into insanity when an hereditary predisposition or powerful exciting mental causes favor the production of derangement of the mind. Antispasmodics are of infinite service in the lower grades of this condition. Nothing is more astonishing in the operation of remedies than the promptness and certainty with which a dose of valerian or assafætida

dispels the gloomy visions of the hypochondriac, calms the hurry and agitation of nervous excitement, allays commencing spasm, and diffuses a soothing calm over the whole being of one who but an hour before was a prey to a thousand morbid sensations, and thick-coming fancies of danger, wrong, or loss. Even on the verge of an outbreak of hysteria or frenzy, these medicines, or a dose of ether, or of Hoffmann's anodyne has often sufficed to calm the rising waves of excitement, and ward off the attack.

But the success of this method depends altogether upon the predominance of a purely nervous element in the case. It is scarcely necessary to remark that neither hysterical nor maniacal excitement which is independent of the nervous diathesis, is favorably affected by antispasmodic medicines, and least of all, that which presents itself in persons of a full and plethoric habit. In such cases active bodily and mental employment, the cold bath, and purgatives are more effectual.

The local nervous disorders which are more or less curable by medicines of the present class, chiefly affect the heart and lungs, but they are, except in the case of spasmodic asthma, very seldom of a purely nervous character, and this affection is much more under the control of debilitants than of any stimulants whatever. The inhalation of anæsthetic vapors is, to some extent, an exception to this rule. In whooping-cough assafætida has been vaunted as a specific remedy, and it would appear peculiarly suited to correct the material bronchitic disorders which exist in this disease, which, however, is curable by several other and different remedies more surely than by this. There is a nervous cough which appears to be one of the innumerable manifestations of hysteria, and when it is so, antispasmodic medicines will be found to relieve it. But unless the proof of its hysterical character be very distinct, a cough may generally be referred to a material cause requiring a class of remedies different from these for its removal; and, unfortunately, there are but few well-instructed practitioners who have not been called upon to pronounce a so-called nervous cough, the evidence of an organic and incurable disease of the lungs.

But while the danger of falling into this error is insisted upon, it would be an equally gross, if a less serious mistake in every instance to attribute, not only the symptom, but its degree of severity, to the physical disease which may be present. In the case but just now referred to, a constant and harassing cough, without any reason for its existence in the seat or the extent of the pulmonary affection, may depend, in a great degree, upon nervous irritability, and may be palliated or even suspended for a time by a judicious combination of antispasmodics and narcotics. The same remark is applicable to those cases in which, while there is complete integrity of the lungs, a cough is excited by irritation in some other organ, cases which often require a searching investigation before the real cause of the symptom can be detected. Such examples are by no means confined to the hysterical and nervous, although perhaps most frequent among them.

In other affections, also, a spasmodic and a material element are combined. A familiar example is furnished by whooping-cough,

which is most efficiently treated by remedies of the expectorant class associated with antispasmodic medicines. In emphysema of the lungs a similar association frequently occurs when this disease is marked by asthmatic paroxysms, and also in many cases of organic disease of the heart. In these and all analogous instances, remedies of the present class, and especially anæsthetic inhalations may be prescribed with advantage.

The forms of nervous disease which affect the muscular system with debility or paralysis, are but little influenced by antispasmodic medicines. Persistent loss of power appears to be the element most opposed to their success, for it will be observed that in all cases whatever, in which they act beneficially, the phenomena are not uninter-

rupted, however frequently they may recur.

As might indeed be suspected, after the simple announcement of this fact, antispasmodic agents are seldom competent to effect a cure of any of the more prolonged diseases in which they are administered. They palliate the existing phenomena, and may for some time continue to do so, but their influence is transient, and in spite of the administration of increased doses, it finally ceases to be felt. Partial exceptions to this statement are found in oxide of zinc and ammoniated copper. But the former of these medicines, and perhaps the latter also, are destitute of the properties which distinguish the vegetable medicines usually associated with them, and were it not for their apparently specific influence upon the nervous system, both might be classed with tonics more appropriately than with antispasmodics. Apart, then, from these exceptions, while antispasmodic medicines exert a powerful, it is still a temporary, superficial and palliative operation, preparing the system for the more permanent and radical influence of tonic remedies and the appliances of dietetics and hygiene.

Most of the medicines we are about to examine will be found to possess in common the singular property of a strong and penetrating odor. In two instances it is animal in its source and character, and in several more it has peculiarities which suggest its resemblance to animal rather than vegetable emanations. This is a very striking and curious fact, especially when viewed in connection with the analogy of this odor with that of ammonia, the double source of the latter in the two animated natural kingdoms, and its analogous influence on the nervous system. It cannot be that these resemblances are accidental, but to propose an explanation of them would, perhaps, lead further from the pathway of fact into the field of speculation, than would be consistent with the limits prescribed to the present work.

ALLIUM, vid. Expectorants.

ASSAFŒTIDA.—ASSAFETIDA.

DESCRIPTION.—Assafetida is the concrete juice of the root of Narthex assafætida, an umbelliferous plant which flourishes in Persia and the adjacent countries. This fact was determined by the German

traveller Kaempfer in 1687. It is procured from incisions made in the upper part of the root. In commerce it is met with in the form of tears, or more commonly in irregular reddish-brown masses. chief constituents are resin and gum, and it contains from 50 to 75 per cent. of the former and about 20 per cent. of the latter, besides nearly 4 per cent. of volatile oil.

The following are the officinal preparations of assafetida:—

Emplastrum Assafætidæ.—Plaster of Assafetida.

This plaster is made by incorporating assafetida and galbanum with lead plaster and wax.

Mistura Assafætidæ.—MIXTURE OF ASSAFETIDA.

This preparation, sometimes called lac assafætidæ, or milk of assafetida, is made by triturating one hundred and twenty grains of assafetida with half a pint of water. The addition of the tincture to water produces a similar, but more stimulating, mixture, which is especially adapted for use as an enema.

Tinctura Assafætidæ.—Tincture of Assafetida.

The tincture is made by macerating, for two weeks, four ounces of assafetida in two pints of alcohol, and filtering through paper. Its dose is a fluidrachm.

Pilulæ Assafætidæ.—Pills of Assafetida.

These pills are made by beating together a troyounce and a half of assafetida and half a troyounce of soap in fine powder, and dividing the mass into two hundred and forty pills. Dose, one to four pills.

Pilulæ Aloes et Assafætidæ.—Pills of Aloes and Assafetida.

These pills are made by beating together equal parts of aloes, assafetida, and soap, and dividing into pills so that each shall weigh about four grains. From two to five given at a dose.

Pilulæ Galbani Compositæ.—Compound Pills of Galbanum.

Three hundred and sixty grains each of galbanum and myrrh, and one hundred and twenty grains of assafetida, are beaten up with a sufficient quantity of syrup, and divided into two hundred and forty pills. Each pill contains about three and a half grains of the mass.

From three to five pills may be given at a dose.

HISTORY.—The name of this drug is said to have been imposed by the school of Salernum, but was no doubt originally derived from the Persion asa or assa, which signifies gum.² The Germans call it stercus diaboli, while in the East it is known by a title which signifies God's meat.3 These epithets sufficiently express the aversion which the drug excites in those who are unaccustomed to its use, and the esteem it is held in by those who are more familiar with its qualities. It is uncertain whether outpoor of the Greeks, and laser of Latin authors, really designate the substance under consideration; the account which they. give of its uses, therefore, loses much of its interest in connection with the present subject, particularly as it adds nothing to the knowledge which later and more definite observation has furnished.

For a full account of the historical question vid. STRUMPF, loc. sup. cit.

² Strumpf, i. 756. ¹ MUBBAY, Apparat. Med., i. 361.

⁴ PLINY, Hist. Nat., lib. xix. cap. 3. ³ Асоята, р. 281.

When fresh, and before it has concreted, assafetida is said to have an extremely powerful smell and taste, which it loses in a great degree by age. The odor bears a striking resemblance to that of garlic, but is at the same time more fetid and aromatic; the taste is acrid and bitter, and very persistent in the fauces. In Persia it is used as a condiment, either mixed with the food or rubbed upon the vessel in which the latter is contained. It is regarded as useful in correcting the flatulence to which the Orientals, as great vegetable-eaters, are subject. These people employ it also as an application to wounds, and believe it to possess aphrodisiac virtues. Acosta relates that it is used in the East to relieve horses of wind confined in the bowels, and also that it is thought to appease the toothache when introduced into a carious cavity.

On Animals.—When assafetida or its volatile oil is ad-ACTION. ministered to animals, and some hours afterwards they are killed, the characteristic odor of the drug has been detected in the blood of the mesenteric veins, according to some authorities. (Flandrin.) The reporters of the Philadelphia Academy of Medicine, in some of their experiments, did not detect the characteristic odor in the serous cavities, the thoracic duct, or in the blood of the carotid artery. But in another one, when the fetid solution had been thrown into the rectum of a cat, its odor was soon afterwards recognized on the animal's breath, and in the blood of the jugular vein and of the carotid artery. When a solution of the drug was injected into the abdomen of a cat, its odor was perceived in the animal's breath, in the serous and mucous cavities, and in the blood. Although a portion of these experiments furnish negative results, the remainder demonstrate that assafetida is absorbed by the bloodvessels.

On Man.—Jörg endeavored to estimate the action of assafetida, and made comparative experiments with it upon eleven persons in good health. He found that distinct effects were produced by doses of a single grain, and that they often lasted for two or three days; and also that the susceptibility to be influenced by the drug varied in different In doses of gr. ss—gr. xx, it gave rise to characteristic aliaceous eructations which often lasted for twenty-four hours, showing how long the medicine remained in the stomach; a burning sensation in the fauces which continued for many hours, and a swelling of the under lip, were observed in several cases; the digestion was not rendered more active, but rather impaired; there were pain, oppression, and fulness of the stomach, distension of the abdomen, a discharge of fetid gas from the bowels, frequently a strong inclination to go to stool, and sometimes thin and repeated evacuations. At the same time the head was more or less affected with flying pains, various nervous or hysterical phenomena displayed themselves, and there was a general sense of malaise. The pulse and respiration often became slower,

In the repugnance which we feel at the idea of using so loathsome a substance as a condiment, we are apt to forget that garlic-eating, which is equally offensive, prevails in the most refined of Christian nations, and that half-putrid cheese and stinking game are ranked among the greatest delicacies by English epicures.

2 Phila. Jour. of Med. and Phys. Sci., iii. 290.

^{*} Compare Jörg, Materialien, Mitscherlich, Strumpf, &c.

the cutaneous and pulmonary exhalations were increased, the urine was not augmented but became more acrid and burning; the sexual desire was sometimes excited, and the menstrual period advanced. In larger doses, 10 to 30 grs., assafetida increased the secretions of the abdominal and pulmonary organs, but especially of the liver and bowels, augmenting the peristaltic action of the latter. It excited the appetite and digestion, produced discharges of intestinal flatus, improved morbid secretions of the mucous membrane, and caused the expulsion of intestinal worms. A continued use of the medicine, on the other hand, enfeebled the digestion, and still larger doses, besides colic and heat in the abdomen, produced nausea, vomiting, and diarrhœa.

After reading this detail of numerous and distinct symptoms produced by small doses of assafetida, the reader will scarcely be prepared for M. Pidoux's statement, that after taking half an ounce of good assafetida at a single dose, he was not aware of any change except that all of his secretions became horribly fetid for the space of two days.1 Jörg could not detect the smell of assafetida in either the urine or the sweat of persons who were using it. But, it is affirmed, on the other hand, that among the Asiatics, who, as already stated, make a free and daily use of this substance, it renders the perspiration intolerably offensive. Barbier detected the smell very distinctly in the urine of a girl who was using assafetida. The characteristic odor has also been perceived by others in the secretion from ulcers,

as well as in the urine of those who were taking it.

In attempting to appreciate the action of the remedy, Neumann observes: whether it acts directly or indirectly on the nervous system is a question of trifling moment, even if it were possible to answer it. It is certain, however, he proceeds, that it invigorates the brain and muscular system, and influences the organic life of the nervous and vascular system more beneficially perhaps than any other medicine. Whatever part of the economy it acts upon favorably, it does so simply by increasing its normal power. While its only disagreeable influence on the stomach is to excite fetid eructations, it, on the other hand, improves the appetite, strengthens digestion, and relieves spasmodic affections of the intestines. To all the other systems, he is of opinion that it acts as a wholesome stimulant, among other things strengthening the vision and enlivening the spirits. This favorable statement, it must be remarked, is not fully borne out by general experience, which proves it to play, like other nervines, a very subordinate part in the cure of disease.

REMEDIAL EMPLOYMENT. Diseases of the Nervous System.—It is not in purely nervous affections that assafetida has gained the greatest credit; the most that can be expected from its use is to palliate the . symptoms during the paroxysms of the disease; a radical cure is to be sought for in the use of more powerful medicines. In epilepsy it may be held as perfectly useless; and that little can be expected from it, may be inferred from the fact that it rarely forms part of the cumbrous list

¹ Thérapeutique, 5ème éd., ii. 220.

of specifics for this affection. Assafetida is one of the most valuable agents that can be employed in the treatment of hysterical cases, because it palliates several extremely annoying symptoms, but not because it is capable of removing the principal or radical disease. Cullen, who lauds its anti-hysteric virtues, would seem to have reference only to its action during the paroxysm, for he remarks, that when it could not be taken by the mouth, he has "found it given in glyster to be very effectual." Hypochondriasis may sometimes be benefited by the direct influence of assafetida upon the nervous system, but more generally the degree of good it is capable of is due to the action of the drug upon the digestive function, which is the source and startingpoint of the morbid phenomena in this disease. But of this action more specific mention will be made below. According to Neumann nothing more effectually relieves the paroxysms of spasmodic asthma than assafetida, and he recommends as extremely prompt and efficacious the following mixture: B.—Tr. fœtid. f3iij; tr. lobeliæ f3j; of which forty drops are directed for a dose. Evidently the lobelia is, in this instance, the capital ingredient of the prescription, and consequently the evidence of the author cannot be allowed to weigh against that of Pereira, who says that he has never seen assafetida give relief in purely spasmodic asthma, or of Cullen, who states that he seldom found it of much service. Trousseau and Pidoux, however, affirm that in their hands the remedy has produced incontestably good results. Several authors speak of the efficacy of assafetida in neuralgia, but there is no proof of its possessing even a palliative influence over this affection, except indirectly, or by improving the vigor of the digestive apparatus, and diminishing the susceptibility to external impressions, which is so frequently the immediate cause of neuralgic paroxysms. But, even in this respect the medicine is very much inferior to those which influence more directly and powerfully the source of the disease.

Diseases of the Respiratory Organs.—In chronic catarrh, with or without spasmodic dyspnœa, assafetida is frequently of marked advantage. Cullen regarded it as more useful in such cases than the other fetid gums, and Neumann states that he has found it, in combination with oxymel of squills, perhaps the most efficient remedy that he employed. When the wheezing is considerable, and the expectoration is rendered difficult by general debility, or when the cough is spasmodic, much benefit may be derived from this medicine. Such a combination of symptoms occurs frequently among persons advanced in life. Miller, Kopp, and others have vaunted the efficacy of assafetida in whoopingcough. The last-named writer affirms, also, that children have less repugnance to it than some other medicines which seem less nauseous, so that they readily become used to it, and even grow fond of its taste when it is combined with mucilage and sugar.2 It has also been recommended to administer it by enema in the evening to prevent, or at least moderate, the paroxysms which destroy the rest and exhaust the strength of the little patients. But in a disease of such long duration,

¹ Mat. Med., ii. 367.

Archives Gén. de Méd., xvi. 289.

of the latter affection, there is no satisfactory ground for the favorable opinion he expresses. The symptom alluded to is tympanites, which occasionally is so extreme as to impede respiration seriously, and probably, also, to interfere with the action of the heart. Nothing can be more appropriate than fetid enemata to mitigate the suffering and lessen the danger which this state involves.

After nervous apoplexy, or that form which seems to consist in simple congestion of the brain, of such violence, however, as to produce more or less paralysis, the latter symptom may continue for some time after the attack, and gradually diminish until it completely disappears. A gently stimulating treatment addressed to the nervous system hastens the cure. Among the remedies for this condition, assafetida deserves a prominent place, for its property of imparting vigor without exciting, renders it appropriate. It has also been recommended as a cure for chorea, especially when the disease occurs about the age of puberty in females. The establishment of the menstrual function frequently cures spasmodic affections, and the emmenagogue properties of assafetida may therefore become the indirect means of its removing the nervous disorder. Under other circumstances, its power over chorea may be regarded as almost null.

ADMINISTRATION AND DOSE.—Assafetida plaster is sometimes applied to the abdomen to relieve habitual flatulence, and to the back of the chest in whooping-cough. It has also been said to prevent the development of caries of the vertebræ, but the symptoms mistaken for that disease were probably those of spinal neuralgia.

As a clyster, for ordinary purposes, a simple mixture by trituration of assafetida with hot water suffices; the officinal preparation is more actively cathartic. It is, perhaps, the most useful of all the modes of administering the drug.

Assafetida mixture is the most prompt and decided in its action of all the forms for administering assafetida by the mouth, but its taste renders it objectionable. Dose: one or two tablespoonfuls frequently repeated.

The various simple and compound pills into which assafetida enters are best suited to those habitual states of flatulence in nervous and feeble subjects which are so common in this class of patients. The best formulæ are those which combine with this drug a laxative and a tonic, such as pil. aloes et assafætidæ, and the pil. galbani compositæ.

The drug is seldom prescribed alone, but in powder or pill its dose is from 5 to 15 grains. The tincture of assafetida may be occasionally given in the dose of a fluidrachm, but owing to the alcohol contained in it, it does not answer for habitual use.

DRACONTIUM. - DRACONTIUM.

DESCRIPTION.—Symplocarpus fætidus or Dracontium fætidum is an indigenous plant, growing in low and moist situations. It has very large, smooth, and fleshy leaves, ovate or heart-shaped, with greenish bracts. The flower-sheath is hood-shaped, and marked with purple

spots. The flowers are numerous and small, and are closely set upon a rounded and elongated spadix. The root, which is the officinal portion, is a large tuber, with numerous fleshy fibres. The whole plant exhales an acrid, rank, and nauseous smell, which has obtained for it the name skunk-cabbage, polecat-weed, &c. It has a very acrid taste. These qualities are partially dissipated by drying; but, if the operation is carefully conducted, the root retains a portion, at least, of its virtues.

ACTION AND USES.—Dr. Bigelow states that in small doses this plant is stimulant and antispasmodic, and in large ones narcotic, and that thirty grains of the powdered root, if freshly prepared, will bring on vertigo, nausea, and frequently vomiting. Locally, it acts as an irritant.

Its medicinal power was first indicated by Schoepf as being expectorant, stimulating, and incisive (incidens), and the Rev. Dr. Cutler, of Massachusetts, drew attention to its virtues in spasmodic asthma by describing its effects upon this disease in his own person. He employed the powdered root in doses of from thirty to fifty grains during the paroxysms. Dr. Bigelow states that in certain forms of asthma, and in chronic catarrh, it succeeded, even when the disease had previously been of great obstinacy; and Eberle says that in chronic cough, attended with a cold, phlegmatic habit of body, he employed it with the most decided benefit. Dr. Thatcher, and also Dr. Heintzelman, state it to be useful in the spasmodic stage of whooping-cough. In hysteria, spasmodic pains, in "spasmodic affections of the abdominal muscles during parturition or after delivery" (Thatcher), in chronic rheumatism, and also in "dropsy," it has been recommended. It may therefore be used when its quality is good; but several other medicines are more to be depended upon.

From ten to twenty grains of the recently-dried root may be given at a dose. An infusion made by displacement, with an ounce of the root to a pint of cold water, may be prescribed in the dose of one or two tablespoonfuls. A saturated tincture may be prepared in the same manner, and administered in the dose of one or two teaspoonfuls.

SUCCINUM. -- AMBER.

DESCRIPTION.—Amber is supposed to be the fossil resinous product of some extinct species of conifera, an opinion based upon the microscopic examination of the vegetable fragments contained in it. Other views of its nature and origin have been proposed by various naturalists, who have pronounced it to be concrete petroleum, hardened honey, oil of turpentine solidified by an acid, a product of the decomposition of wax, and various other things altogether fanciful.² Amber is found chiefly upon the borders of the Baltic Sea, and in the North of Asia. It occurs in yellow or reddish translucent masses, which are

^{&#}x27; Mat. Med., p. 167.

For a learned history of this substance consult STRUMPF, Handbuch, &c., i. 787.

brittle, and have a resinous fracture. When rubbed briskly, it becomes negatively electric; and at the same time, or, still better, when powdered and thrown upon coals, it emits a grateful and aromatic fragrance. It has no decided taste. It is soluble in strong alkaline fluids, and somewhat less so in ether. Two preparations of amber have been used in medicine, viz., succinic acid and rectified oil of amber (OLEUM SUCCINI). The latter is obtained by the dry distillation of amber. When freshly prepared, it is a yellowish transparent liquid, with a pungent and peculiar odor, and a hot, acrid taste. In composition it is a hydro-carbon, but is oxidized by exposure to the air, and becomes dark and thick. Succinic acid is obtained from amber by sublimation. When purified, it forms white crystals, of acid qualities, soluble in cold, but more readily in hot water and in alcohol.

ACTION AND USES.—The fumes arising from amber thrown upon burning coals are apt to provoke coughing. Succinic acid is said to raise the pulse, promote diaphoresis and the secretions of the lungs, and to augment the activity of the nervous centres. Oil of amber is a powerful irritant of the skin. When taken internally, it is reputed to be antispasmodic and stimulant. The first-named preparation was once employed in mucous profluvia of the lungs and urinary organs, much in the same manner as the terebinthinates continue to be used. In debility of the nervous system, and in spasmodic diseases, it was also reputed to be efficacious. Some fanciful persons have even imagined that strings of amber-beads around the neck or limbs control convulsive diseases of an hysterical type. It is, with more probability, reported to be useful in retrocedent gout and rheumatism. Oil of amber has also been given internally for the same affections, but more especially in eruptive diseases, epilepsy, hysteria, whooping-cough, and amenorrhæa. Externally it is employed as an addition to stimulating liniments for rheumatism and paralysis, and as a rubefacient to the spine in convulsive disorders, especially those of children. The fumes of amber thrown on live coals are sometimes used, or raw cotton impregnated with them is applied to the affected parts, in the first-named diseases. Powders and pastilles intended to correct foul smells by fumigation generally contain amber.

The dose of succinic acid is from five to fifteen grains, and of the

oil of amber from ten to fifteen drops.

VALERIANA. — VALERIAN.

DESCRIPTION.—The root of Valeriana officinalis. This plant is a native of Europe, and belongs to the family of Valerianaceæ, a name said to be derived from the Latin valere, and intended to express the wholesome properties attributed to the plant. The nard or spikenard of antiquity, so renowned among the aromatics of the East, was a preparation of valerian, V. Celtica. Valerian grows throughout Europe, and in every variety of soil, but is said to have a stronger smell and

¹ Revue Médicale, lxxxv. 84.

HISTORY.—Valerian seems to have been used as a medicine from an early period. All the ancients describe it as being diuretic and emmenagogue. Galen affirms that by its means he cured adults and children of epilepsy. Fabius Columella vaunted its anti-epileptic virtues, which are also maintained by Alston. Hoffmann regarded its diuretic properties, at least, as unquestionable. Externally, says Schroder, it strengthens vision, removes opacities of the cornea, allays headache, promotes the menses; in baths, it excites perspiration; inhaled, it dries up catarrhs; it tempers the malignity of carbuncles, cleanses foul ulcers, &c. One of the most singular properties of the plant is its effect upon cats, which Matthiolus describes in these terms: "Cats are so fond of valerian that they smell it at a great distance, and purr with delight while they are eating it." A modern author³ paints a still more vivid picture of this singular phenomenon. "In places where valerian is stored," he remarks, "cats may be seen rolling themselves upon it, mewing and purring in the most extraordinary manner, then attacked with spasms and convulsions, and at last expiring in a perfectly voluptuous frenzy." Pringle and Dresky supposed, from their experiments, that valerian had antiseptic properties, the one finding it superior to salt, and the other to cinchona, in this respect. Both were probably mistaken.

ACTION.—The only phenomena excited in the lower animals by valerian have just been described. It acts upon man, in health, as an excitant, but not powerfully. Its powder, applied to the nostrils, produces sneezing, and may be conveniently used as a sternutatory. When taken habitually, and in moderate doses, it augments the appetite and the activity of digestion, without restraining the action of the bowels. Two drachms at a single dose generally occasion a sense of heat and weight in the abdomen, eructations, and frequently vomiting, colic, and diarrhoea; and, along with these symptoms, some excitement of the circulation, augmented warmth of the whole body, and either perspiration or an increased flow of urine. The first effects of valerian upon the nervous system, in doses of from one to two drachms, are to render the mind tranquil, to incline to good humor, and dispose to exertion; but these results are usually accompanied with a lively formication in the hands and feet, and a sensation about the head and spine which has been compared to the aura epileptica. Sometimes there is a sense of embarrassment in the head, with heaviness, or even pain.3 The action upon the circulation is chiefly shown in those of its morbid states in which the pulse becomes frequent and feeble, denoting the exhaustion which succeeds an over-excited state of the nervous system; under these circumstances it renders the pulse less frequent, and at the same time stronger. Barbier mentions the following phenomena as exhibited by a patient in the Hôtel Dieu of Amiens. When about falling asleep, he suddenly started up believing that he saw a great light, and that the side of the ward opposite to him was in flames. Other patients imagined that flashes of fire were

ADAMS, Comment. on Paul Ægineta, iii. 396. * Mat. Med., i. 535.

For, Mat. Med., i. 428.

Apparat. Med., i. 275.

Bee Mitscherlich, Strumpf, op. cit.; and Jorg, Archives Gén., xxv. 402.

an uncontested right to the title of an anti-epileptic, a lot which indeed it shares with every medicine which has been distinguished by this The doubts which obscure the virtues attributed to all medicines are magnified in the case of such as are used in the treatment of nervous affections. The irregularity of the phenomena presented by them, their protean changes, their dependence upon accidental circumstances, the close relation in which they stand to the mental and moral conditions of the patient, render it extremely difficult to distinguish these affections from one another, and those among them of an organic from those of a functional origin. A mature and experienced judgment, guided by all the light which science has shed upon this obscure subject, is the only, though by no means an infallible, safeguard against falling into error. Such circumstances render the task a very difficult one to arrive at a just valuation of the testimony recorded in favor of valerian as a remedy for epilepsy, for it is certain that not a few writers have been imposed upon by the epileptiform convulsions which occur in hysteria and those which frequently arise from temporary disturbance of the excito-motory function, by intestinal worms, and other local and mechanical causes. Nothing can better illustrate the obscurity of this subject and the difficulty of distinguishing epilepsy from less serious convulsive affections, than the unsuccessful attempts which have been made to found such a distinction upon the essential nature of the analogous affections. Thus, when it is said that "the term epilepsy presents to the mind the idea of an essential morbid modification of the cerebro-spinal innervation, a serious, profound, chronic, and obstinate modification, which sooner or later ends by impressing upon the functions, which it at first disturbs at intervals, alterations of a permanent character which annihilate all the functions of the nervous system of animal life," we have an hypothesis and a description combined, a formula which does not add a single idea to our previous knowledge, nor offer us any assistance in recognizing examples of the disease. The only means by which the error of confounding epileptic and epileptiform convulsions can be avoided, is to compare diligently, and one after another, the symptoms presented in each case with those derived from model examples, after which the truth will generally appear. Thus, omitting the consideration of epilepsia minor, or petit mal, the essential phenomena of the epileptic convulsion are the following: it either occurs without warning, or if any, it is in the form of the aura epileptica; the loss of consciousness and sensibility is sudden and complete; the convulsions are tonic, and they are more violent on one side than on the other; the face is purplish or livid, and there is froth upon the lips; after the fit there is at first stupor, then excitement; finally the mind grows feeble when the disease has continued long. Now if these diagnostic marks could be applied to the cases of presumed epilepsy said to have been cured by valerian, the truth would be much more accessible than it actually is, for in nearly all the instances, and especially in those recorded by the older writers, the symptoms are very imperfectly described, or, as more

¹ Pipoux.

Medicine on a memoir of M. D'Huc, in which the author relates seven cases, of which six were recent and the remaining one of seven years' standing. Valerian was administered in decoction and extract, and of the latter the daily dose was from one to two drachms. Under its use, the paroxysms declined in frequency and severity, and ceased after a period of from five weeks to three months. In all of the cases except one the cure appears to have been permanent. Other patients treated subsequently by M. D'Huc presented less satisfactory results.1 Richter relates several cases of cure in his own practice by means of such combinations as are referred to in the foot-note. Copland from his own experience speaks favorably of valerian, provided that it be appropriately administered, and that depletion and evacuations have been premised in plethoric cases.2 On the whole, there can be no doubt that valerian has sometimes cured genuine epilepsy, and that it is most successful in young patients, and when the disease is of recent origin. In the case of children it must not, however, be forgotten that the remedy is an efficient anthelmintic, and that it very probably has sometimes cured the spasmodic affection by destroying the worms upon which the attacks depended. In other cases, where the convulsions have originated in fright, suppressed emotion, or in a simple susceptibility of the nervous system to more ordinary impressions, the efficacy of the remedy is still more unequivocal. But even here it must be given in large doses and perseveringly continued, while other agencies adapted to improve the tone of the nervous system, strengthen the digestive powers, and withdraw injurious excitants, should be prescribed in conjunction with it.

Hysteria and other Nervous Disorders.—In fully developed hysteria, and especially in that form of the affection which occurs in plethoric and otherwise robust females, it is doubtful whether valerian is a remedy of much value. As a palliative, it may be usefully employed to avert paroxysms which some accidental excitement would have provoked, or even to mitigate them when they cannot be averted. It is more useful if the disease attacks females of a weak constitution and excitable temperament, with imperfect digestion, and enfeebled by care and anxiety, and when a tonic as well as an antispasmodic treatment is called for. In such cases it not only is efficient in mitigating the individual attacks, but it will sometimes contribute materially to the complete cure of the disease. The cases alluded to approach most nearly to that undefined disorder of the nervous system

which is described in the next paragraph.

This disorder may be described as hysterical, rather than as being in itself hysteria. It seldom occurs among females who lead an active and laborious life, or among the rural population. Most frequently its subjects are met with in large cities, or wherever habits of luxurious living prevail, where the senses are stimulated to excess, and the imagination is overstrained by exciting scenes, conversation, and books, and by occupations which the artificial wants of civilization create. It consists, at first, in a morbid sensibility to external impres-

¹ Bull. de l'Acad. de. Méd., ii. 759.

² Dict. of Medicine, art. Epilepsy.

which follow loss of blood, and especially profuse and painful menstruction, as well as those which accompany an impoverished state of the system in chlorosis, leucorrhœa, scrofula, &c. M. Déclat has published an account of the efficacy of valerianate of ammonia in a case of facial neuralgia, which had for years resisted every other known treatment, both local and general. It is certainly one of the best palliatives for moderately severe attacks of this disease. In gout the fever is often a consequence of an irritable rather than of an inflammatory state, and is beneficially influenced by valerian, which calms the tumult of the system and gives the patient ease. When this affection attacks the stomach with spasmodic rather than inflammatory symptoms, the same remedy is applicable, and the oil is the most efficient form for its exhibition. Cramp in the stomach is readily relieved by the same means, and that morbid sensibility of the organ which is a frequent cause of chronic vomiting. A mixture of one part of the tincture of valerian with two of the compound spirit of lavender has been successfully employed for this affection, in the dose of thirty or forty drops three times a day. Enemata of the infusion of valerian are recommended in chronic dysentery accompanied with tormina and tenesmus. Valerian is useful in calming the palpitation of the heart which so frequently accompanies dyspepsia. It also moderates the paroxysms of whooping-cough.

Valerian is deserving of a trial in mental derangement produced by sorrow and anxiety, homesickness, disappointment, the puerperal state, &c., before the disease has become rooted, and the patient possessed with a fixed idea. It is also recommended in nervous atony simulating paralysis, a state in which the symptoms of apoplexy are sometimes met with, while the features are pale, cold, and sunken, the pulse small, slow, and infrequent, and the attack ends with a copious discharge of limpid urine. This medicine is also valuable in another condition, which is frequently mistaken for fever, and mischievously treated by debilitating means. The patient is troubled with a sense of fulness in the head, a full, hard, and frequent pulse, and in the after part of the day, congestion of the face, headache, burning of the palms of the hands, and perhaps neuralgic pains. Valerian seldom fails to mitigate these symptoms, and sometimes relieves them entirely, but more commonly it paves the way for medicines of more radically curative powers. In other cases of essentially the same nature the patient is subject to vertigo, accompanied with palpitations of the heart. The blood seems to rush suddenly into the head, and as suddenly to leave it and fall back upon the heart. The combination of symptoms now described is not an infrequent accompaniment of the menopause, and even of the first establishment of the menses, and although it then is, partially at least, dependent upon plethora, the necessity of bloodletting can generally be avoided by the administration of valerian.

This medicine is a valuable adjuvant in the treatment of delirium tremens, and is often sufficient to control the symptoms in those slighter cases which arise in consequence of the shock of unimportant surgical

¹ Brit. and For. Med.-Chir. Rev., Jan. 1857, p. 261.

RICHTER, loc. cit.

injuries. It is frequently serviceable also in nervous headache produced either by mental or physical causes.

St. Vitus' dance is in many cases successfully treated by this medicine. Several examples of the sort are recorded by Murray, but in most of them it would seem that iron, Dippel's animal oil, or some other medicine was associated with the valerian.

Inflammations and fevers of a nervous type are reported, especially by German authorities, to be favorably influenced by valerian. Neumann states, as conditions for its use, the absence of enteric inflammation, and an uneasiness which impels the patient to change his posture every moment, and when there is either delirium, or the mind is so excited as to be in a state of constant tension. This author ascribes to valerian a quality analogous to that belonging to opium, a power, namely, of moderating the excitement of the vascular and muscular systems growing out of excessive and irregular nervous action.' The same indication is regarded by Richter, after Jörg, as debility combined with morbid sensibility, and he describes it as follows: the pulse is small, unequal, and jerking; the movements uncertain; the tongue trembles when protruded; there is quiet delirium, and some insensibility; a cool, pale, dry, and inactive skin; incomplete and rapid respiration, with sighing; injected and dull eyes; limpid urine; restlessness, sleeplessness, anxiety, &c. Valerian is regarded as all the more valuable here, because there are hardly any contraindications to its use; and it is confidently recommended even during inflammation of internal organs, gastric disturbance, bilious, mucous, and putrid states of the economy, profluvia, exanthems, &c. It is also especially commended in simple catarrhal and rheumatic affections occurring in persons of an excitable temperament and predisposed to nervous attacks, and in all fevers in which the peculiarities of this temperament predominate. In most of the above cases it may be combined with stimulants and other antispasmodics, as well as with tonics, and especially with cinchona.

Indications very similar to the above, but furnished by a somewhat different pathological condition, are set forth by Pidoux. They are presented by those inflammatory and other affections in which depletion has been carried to excess, and consist of certain nervous symptoms which interfere with convalescence. Thus sometimes in the decline of pneumonia, and typhoid fevers, when ataxic and adynamic phenomena supervene in consequence of profuse hemorrhage from the nose or bowels, and the abdomen continues tympanitic but indolent, when, in a word, debility and excitability prolong one another, great benefit is to be derived from valerian. The same indication sometimes presents itself in the course of eruptive fevers, in consequence either of the repercussion of the eruption, or of some other accidental cause giving to the symptoms a typhoid or malignant type.* These general statements have received confirmation from the experience of Dr. J. Leasure, of Pennsylvania, in the treatment of typhoid fever with oil of valerian. He at first used it in cases of extreme pros-

¹ Heilmittel., p. 570.

² Mat. Med. and Thérap., ii. 178.

tration and exhaustion, when alcoholic stimuli were either rejected or proved ineffectual, and afterwards in earlier stages of the disease. usually provoked diaphoresis, and at the same time diminished the diarrhœa. In two cases complicated with delirium tremens the symptoms of this affection were evidently under the control of the remedy.1

As a vermifuge valerian is deserving of some credit, although it is doubtful how far it acts specifically in destroying intestinal worms. It is more certainly useful in counteracting the weakness of the bowels which these parasites produce. A somewhat celebrated vermifuge of Störck is composed as follows: B.—Sulph. potassæ c. sulphure, jalapæ, valerianæ, āā 3j; oxymel, scillit. 3iv. Dose for an adult 3ss

four times a day.

ADMINISTRATION AND DOSE.—Valerian may be administered in powder, in doses of from thirty to ninety grains, repeated three or four times a day. Its disagreeable taste may be somewhat disguised by the addition of a few grains of mace. The infusion is prepared with from 60 to 120 grains of the root in half a pint of water, to be taken in twenty-four hours. An extract prepared by displacement may be prescribed in doses of from ten to forty grains. The fluid extract is to be preferred. Its dose is from one to three fluidrachms. The tincture, owing to the quantity of alcohol contained in a dose, is not an eligible form of this medicine. The ammoniated is preferable to the simple tincture, and the elixir of valerianate of ammonia to either. The oil of valerian is a favorite form of the medicine in German practice, and is more decidedly antispasmodic and stimulant than the other preparations. It may be prescribed in the dose of from four to six drops mixed with sugar, or dissolved in ether or sweetened acids, and is perhaps, after the fluid extract, the most eligible form of the medicine for temporary uses. The infusion is applicable to the greatest number of cases. The powder is said to be preferable in cases of epileptiform convulsions, and for worms.

CASTOREUM.—CASTOR.

DESCRIPTION.—Castor is a glandular secretion contained in a pair of sacs on either side of the space between the anus and prepuce or vulva of the beaver (Castor fiber). It is regarded as a sort of smegma intended to lubricate the adjacent organs. It is more abundant in the male than in the female animal. In the fresh state, castor is soft and unctuous, but not fatty, to the feel, and it grows waxy by keeping; its color is brownish-yellow, and it has a strong musky or hircine smell. The castor of commerce is of two sorts, the Russian and the American, the former of which is by far the most powerful, and commands more than thirteen times the price of the latter.

HISTORY.—The ancients imagined the castor sacs to be testicles.* In the Hippocratic writings castor is prescribed with pomegranate

¹ Am. Jour. of Med. Sci., April, 1855, p. 370.

For information on the history, dissemination, &c., of the beaver, see an abstract of a paper by Dr. CHARLES WILSON, Edinb. Med. Jour., iv. 82.

the pulse more frequent. In persons of a highly nervous temperament, and in females actually affected with hysteria, it has been found to excite the pulse, increase the warmth of the skin, and the cutaneous transpiration, and in large doses, to produce some fulness and dulness of the head. It is also alleged by Thouvenel to increase hysterical attacks in morbidly susceptible females when given alone, but in combination with opium to produce the best results. A similar opinion is expressed by Richter. Other authorities, moreover, ascribe to it a power of lessening the narcotic action of opium, while it derives from combination with this medicine an increase of its antispasmodic

powers.

Uses.—Castor has been employed and vaunted in the treatment of a number of diseases in which derangement of the nervous system forms either the principal or a subordinate element. Among diseases of the first class may be enumerated hemicrania, spasm of the œsophagus, and hysterical spasms of every variety;3 and among the latter, muscular subsultus and agitation occurring in low fevers, also hiccup, flatulent colic, and spasmodic dysmenorrhæa. Yet, even when it operates most favorably in purely spasmodic affections, it can only be regarded as a palliative, capable of alleviating the existing paroxysm, but without further efficacy in the disease. When hysteria is connected with abdominal cramps and tympanitis, with uterine colic and scanty menstruation, a case is presented in which, by the concurrence of all the older authorities, castor is peculiarly useful. More recent observers have confirmed their statements. Trousseau and Pidoux limit their description of the indications referred to by mentioning only amenorrhoea and painful tympany of the abdomen. Allusion is made to those cases of uterine tenesmus in which the paroxysms of expulsive pain are accompanied with the discharge of only a few drops of blood. It may be doubted, however, whether the tenesmus in these examples is not more promptly and effectually relieved by belladonna, and the accompanying tympany by fetid enemata. Richter is of opinion that castor is very prejudicial to persons of a certain constitution, which he describes as a relaxed organization, connected with great susceptibility, excitability, and a tendency to inflammation. But so exact a determination of the virtues of such a medicine as castor may be suspected of being hypothetical.

The value of castor in the nervous forms of low fevers, if real, is so far inferior to that of valerian, opium, and the diffusible stimulants, as to demand no more than a passing notice. It seems to be chiefly indicated in the flatulent colics which sometimes arise in these affections, either spontaneously, or, what is more common, perhaps, from the injudicious use of purgatives. Cloquet, however, is reported to have used it with advantage in the last stage of adynamic fevers, but

whether alone or in combination does not appear.4

Administration and Dose.—Castor may be administered in sub-

¹ BARBIER, ii. 239. 2 STRUMPP, loc. cit.

³ It has also been recommended, with Peruvian bark, in whooping-cough, by Dr. Morris, Med. Obs. and Inq., iii. 281.

⁴ Mérat and Dr Leys, op. cit., ii. 140.

stance, in doses of from ten to one hundred and twenty grains, according to the quality of the specimen employed. The dose of the tincture, which is officinal (TINCTURA CASTOREI), is from half a fluidrachm to two fluidrachms. As ordinarily found in the shops, castor and its preparations cannot be depended on; and even if the finest quality of Russian castor were always accessible, its extravagant price and very, limited usefulness would render it a luxury that might easily be dispensed with.

MOSCHUS.-MUSK.

NATURAL AND MEDICAL HISTORY.—Musk is a peculiar concrete substance obtained from Moschus moschiferus, an animal found in Central Asia, and which chiefly inhabits the mountainous regions lying between Siberia, China and Thibet. This animal bears some resemblance both to the goat and the deer, but is without horns, and its canine teeth are very long, prominent, and curved. It lives on thickly wooded mountains, and is extremely timid. The musk sac, which is found upon the belly of the male, and behind the umbilicus, is an oval pouch covered by the abdominal integuments, and presents on its under face a longitudinal groove which lodges the anterior extremity of the penis. The sac itself is formed by three membranes, the internal one of which is thrown into folds which form septa and cells in which the musk is secreted. The opening of the sac is immediately in front of the orifice of the prepuce. In the living animal the musk is semi-fluid. It is most abundant in the adult, and during the rutting season, at which time, also, its odor is strongest. The object of this secretion has by some been conjectured to be the excitement of the female organs during the act of coition; it is also regarded as analogous to the sebaceous secretion which is formed within the prepuce of other mammals; but the two explanations do not conflict with each other.'

As found in commerce, musk is in small, dark-brown grains, and has an unctuous feel. Its taste is bitter and rather acrid, and its odor extremely penetrating and permanent. It is soluble in hot water and in alcohol, ether, and the yelk of egg. Besides neutral animal matters, it contains ammonia, a volatile oil, and a fatty substance.

The strong and permanent odor of musk is not due to a volatile principle, for it cannot be driven off by distillation, nor isolated in any manner. When dried by the help of sulphuric acid, it loses its odor for the time, but when moistened directly, or allowed to attract moisture from the air, it regains its smell. Geiger and Reimann dried and moistened musk alternately for thirty successive times, but without in any degree impairing its odor. These facts have given rise to a belief that the smell of musk depends upon a gradual but incessant decomposition of the substance. It has also been suggested that as the extrication of ammonia causes the volatilization of particles which

ł

¹ Dieu, Mat. Méd., i. 507 et seq.

are naturally inodorous, and as it is proved that ammonia is constantly given off by musk, therefore the odor of this substance is developed by the continued extrication from it of ammonia. The same odor, it may be mentioned, is one of the most common in the vegetable and animal kingdoms. The musk geranium, the musk rose, the musk melon, &c, are familiar examples. Several substances, among which bile may be mentioned, exhale it while undergoing decomposition. It strongly impregnates the exhalations of some females during the menstrual epoch, and especially of the negro and mulatto. Dr. Graves relates a case of delirium tremens which was treated by opium only. After the first day or two of the attack the patient began to perspire very profusely, and to exhale so strong an odor of musk that it very soon filled the whole house.

Musk appears not to have been known to the early Greek or Roman physicians. Most of the Arabian writers celebrate its virtues, which they represent as cordial, stomachic, antispasmodic, and aphrodisiac.2 It began to be spoken of in Europe during the sixteenth century, as a remedy for hysteria, and the fact was then already noted that in very sensitive persons its odor was capable of bringing on hysterical attacks.3 It was, however, chiefly celebrated for its power of allaying such paroxysms; according to Wedelius it was a "divine remedy" for lipothymia, syncope, palpitation, and asphyxia, and Schreckius places its power of relieving soporose affections, lethargy, and coma, in the very first rank. Upon its introduction into European practice, and indeed until the last century, it was regarded as a sovereign remedy for a great variety of affections. It is now almost as much neglected. The exorbitant price which the drug commands, and the difficulty of obtaining it pure, have no doubt contributed to restrict the field of its usefulness.

Action. On Animals.—Tiedemann injected five grains of musk, dissolved in two ounces of water, into the crural vein of a dog. Respiration was quickened, and the expired air smelled of musk; the pulse was not rendered more frequent, nor was the temperature of the animal increased. Partial insensibility followed, and a cataleptic condition; there were slight spasms during sleep, tetanic phenomena, copious and bloody stools, coma, infrequent respiration, a thready pulse, and then death. The muscles were found to be rigid; the intestinal mucous membrane was reddened, and the canal contained dark blood, as also did the veins.⁴

On Man.—Tralles, in 1783, pointed out the following qualities of this drug. It has a great and wonderful power over the whole nervous system, quickens the circulation, raises the animal temperature, congests the brain, producing drowsiness and intoxication, and causes a sense of oppression and anxiety in the chest. According to Sundelin, about fifteen minutes after taking a scruple of musk a feeling of

¹ Clinical Medicine, p. 816.

PAUL. ÆGIN., Comment. Adams, ili. 469.

³ Vid. TRALLES, inf. citat; and Schrockius, Ephemerid. Acad. Nat. Cur., 1686, p. 231.

⁴ MITSCHERLICH, op. cit., ii. 371.

⁵ Com. de rebus in Sci. Nat. et Med. gestis. xxvi. 434.

the ultimate condition of the patient is one of greater debility than at first.

Hiltscher' ascribes to musk almost exactly the same qualities as those just pointed out, and dwells upon the necessity of giving full and repeated doses in order to develop its effects distinctly. He also blames the custom of prescribing the medicine only as a last resort, a custom which, he says, has led the sick and their friends also to look

upon the prescription of musk as a sentence of death.

REMEDIAL EMPLOYMENT. — In febrile affections, distinguished by ataxic rather than typhoid symptoms, or, to use the distinction of Vogt, when the nervous is more damaged than the vascular system, in febris nervosa versatilis rather than in febris stupida, musk is indicated; for, in pure typhus, when prostratio virium is the most prominent symptom, it is more mischievous than useful, while wine is almost a specific. The distinction here pointed out is probably the one aimed at by M. Pidoux when he attempts to define ataxia pathologically as follows: "Ataxia consists in a want of unity between the nervous and the organic functions, for in this proportion and in the degree of its force or firmness the life of the individual and the degree of his vital resistance abide." The state alluded to will be best understood by means of a description. It usually presents itself after the more active and open symptoms that mark the invasion of the attack, while the pulse is moderately strong and full, the countenance animated, and the vitality of the skin unimpaired. The eye is then observed to grow dull, the hearing becomes impaired, the breathing is anxious and sighing, the speech feeble and stammering; there is a mild muttering delirium rather gay than sombre, floccitation, muscæ volitantes, and hiccup; the tongue is tremulous, and may be brown and dry, smooth and polished, or uneven and pasty; there is subsultus tendinum and twitching of the facial muscles and of the lower limbs; the skin is hot, dull, dirty, dry, and harsh, or else covered with a profuse sweat; and the pulse is small, frequent, tremulous, and irregular. This state tends to pass into coma or collapse, in either of which musk would be as unavailing as improper; but to counteract the symptoms which have been described, nothing acts with more promptness or certainty. This is doubtless the state which Cullen had in view in the following passage:—

"We abstain from musk in inflammatory cases, or in cases where the diathesis phlogistica is supposed to exist, and in topical affections of the brain; but I am disposed to say that even in these cases it may be employed with more safety than opium, so far as my experience goes; and in fevers, without much nicety in discerning the circumstances, wherever the symptoms of strong spasm appear, where there is a delirium, subsultus tendinum, and convulsive motions, without the irritation being remarkable, and where we presume the disease to be in the nervous system, there musk has been of considerable service."

Sarcone, who used the remedy very extensively in the epidemics

¹ Sobernheim, op. cit., 192.

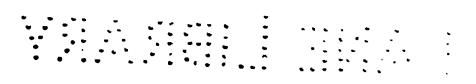
³ Op. cit., ii. 202.

^{*} Lehrbuch, &c., i. 269.

⁴ The Works, &c., 1838, i. 633.

quite as readily over symptoms which were the natural fruits of injudicious treatment. The general testimony of medical writers is, however, favorable to the virtues of musk in ataxic pneumonia and other inflammations of the same type; and it would perhaps be as available in this state when it occurs spontaneously through the violence of the disease, or, what is more probable, from the constitution of the patient, as when it is indirectly generated by an unwisely perturbating There remains a still purer form of ataxia in which the benefits of musk are not problematical; a form in which typhoid symptoms do not exist, but those rather of febrile delirium, and which are only to be distinguished from the latter by the absence of sthenic fever of a high grade. It is thus described by the authors last quoted: "It is purely nervous and maniacal. The brain is in a state of violent excitement, the patients are agitated, insist upon getting up, and rave with furious activity, precisely as if they were under excitement from alcohol. Indeed this sort of delirium is apt to break out in the pneumonia of drunkards." Musk will generally control these symptoms. So, too, will opium, either alone or in conjunction with musk, or with Hoffmann's anodyne, or with alcoholic stimulants prudently administered.

In various spasmodic affections musk has been successfully employed. In convulsive hiccup it is mentioned favorably by Whytt and by Wall. The latter states that two persons laboring under subsultus tendinum, extreme anxiety and want of sleep occasioned by the bite of a mad dog were perfectly relieved by two doses of musk of sixteen grains each. Dr. Huck relates a case of recovery from traumatic tetanus, in which musk formed the main element of the treatment. Cullen states that he "once had a gentleman affected with spasm of the pharynx preventing deglutition and almost respiration. This, when other remedies had failed, was relieved by the use of musk, which often showed its power; for the disease continued to recur at times for some years after, and was only obviated or relieved by the use of the musk." Dr. Owen relates a case of hysterical convulsions which was cured by this remedy.2 The patient, a young lady of seventeen, received a slight electrical shock, and a few hours afterwards experienced similar sensations to those she had received from the Leyden jar. After occurring at intervals for several months, and gradually growing stronger, they at last assumed the form of strong hysterical paroxysms. A variety of antispasmodics, including musk as well as tonics, were employed unavailingly, when at last musk alone, in doses of half a drachm repeated every four hours, was prescribed, and the paroxysms at once began to abate. As often as the use of the medicine was suspended, the fits returned, but less violently, and they were again arrested when it was renewed. The cure was completed by the use of chalybeate waters. In spasmodic croup musk is highly recommended by many German writers, who furnish satisfactory evidence of its curative powers; but it has no greater virtues and probably, indeed, less, than emetics and revulsives in this affection, and is a far less



¹ Med. Obs. and Inq., iii. 330.

accessible and manageable remedy. M. Salathé, of Bordeaux, claims to have cured all but two of twenty-four cases of spasm of the glottis in infants, by the use of musk.' But when it is remembered that the disease so called is in reality a symptom of various pathological conditions, some of which are trivial, and others mortal, we should greatly err in expecting to cure it uniformly by this or any other remedy. The report of M. Salathé is valuable in one respect, however; it proves the virtues of musk in purely nervous cases of the disease. In spasmodic coughs, vomiting, colic, chorea, &c., this medicine has been more or less eulogized by various authors, but on reviewing the evidence on which their opinions rest, it is difficult to accept them unreservedly. All that can be credited is that in these affections musk may be employed as a palliative of moderate efficacy. In proportion as the nervous element of the disease is predominant, may good be anticipated from its use, especially where the inflammatory element is in a like proportion weak.

In retrocedent gout the powers of musk are vouched for by Cullen. One of his patients was frequently attacked by this disease, affecting the stomach, the lungs, and particularly the head with violent headache and delirium. Many of the paroxysms were very suddenly relieved

by large doses of musk, repeated at short intervals.2

Administration and Dose.—Musk is usually administered in the form of pill or emulsion, and in doses of ten grains and upwards, repeated every two or three hours. To children it may be given in the form of enema. A tincture of musk has been employed as an adjuvant to the preceding forms of administering the medicine; but the quantity of such a preparation required to represent the average dose of musk must contain too much alcohol to be frequently repeated.

CAMPHORA.—CAMPHOR.

DESCRIPTION.—The officinal source of camphor, Camphora officinarum, is a native tree of China and the adjacent islands. Camphor is, however, a widely diffused product of the vegetable kingdom. Millot defines it to be an organic product of several plants, which is distinguished by being solid, flexible, white, translucent, of a peculiar odor, and an acrid taste, which leaves a sense of coolness in the mouth, and is extremely volatile.

When small fragments of camphor are thrown upon water, mercury, or wine, they assume a circular, and often at the same time a rotary, motion. If a cylinder of this substance is floated vertically to half its depth in water, it becomes corroded, and is at last completely severed at the surface of the water. The former of these curious experiments has been explained by attributing the described motions to the reaction of the emanations of the camphor against the surrounding water.³

Camphor is insoluble in alkaline solutions, and is very slightly

Bull. de Thérap., l. 330.

^{*} Diec, op. cit., iii. 596.

^{*} Mat. Med., ii. 381.

soluble in water; but is perfectly so in alcohol, ether, oils, and acids. Its sp. gr. is 0.9857.

The following preparations of camphor are officinal:—

Aqua Camphoræ.—Camphor Water.

This is a filtered solution of camphor one hundred and twenty grains, alcohol forty minims, and carbonate of magnesia half a troyounce, in two pints of distilled water. *Dose*, a fluidrachm and upwards.

Linimentum Saponis.—SOAP LINIMENT.

Four troyounces of soap, in shavings, are digested to solution in two pints of alcohol and four fluidounces of water, and, after filtration, mixed with two troyounces of camphor and half a fluidounce of oil of rosemary.

Under the title of LINIMENTUM SAPONIS CAMPHORATUM (Opodeldoc), a preparation was formerly officinal, which had the advantage of containing a powerful stimulant essential oil (oil of origanum), and of possessing the consistence of an ointment.

Spiritus Camphoræ.—Spirit of Camphor.

This is a solution of four troyounces of camphor in two pints of alcohol. It is inappropriate as an internal medicine, unless suspended

in syrup or mucilage. Dose, ten to thirty drops.

MEDICAL HISTORY.—Camphor was introduced into western medicine by the Arabians, who have also left us the earliest description of its virtues. Serapion is the ancient authority from whom the fullest account of this drug is derived. According to him, it is applicable to inflammations, vertigo, and cholera, is anaphrodisiac, induces premature whiteness of the hair, and arrests hemorrhages. Other Arabian authorities state that in large doses it causes indigestion, is an astringent of the bowels, and produces impotence. The last-named quality is celebrated in a distich of the Salernian school—"Camphora per nares, castrat odore mares."

In modern times camphor has been ranked among the most useful remedies. Its vogue has, however, greatly declined during the present century, in consequence, it may be presumed, of the controversies concerning its action which divided the medical world; for while several of the most eminent authorities regarded it as a sedative, others, of no less distinction, maintained it to be a stimulant. As too often happens on such occasions, the contending parties were more zealous in refuting one another than anxious to establish the truth concerning the subject of their dispute.

ACTION. On Plants.—Withered plants revive with remarkable quickness in camphor-water, but ultimately perish under its influence. Cut portions, according to Göppert and Miguet, become brown and dry more or less quickly, according to the course of their vessels and their structure. Plants that secrete a milky fluid lose this faculty, and such as have a motor power are paralyzed. Plants sprinkled with camphor are speedily and certainly killed, and the color of their flowers is changed by it. Only to the lowest class of the vegetable kingdom is camphor innocuous; mould will even form in glasses that

¹ Adams, Comment. on Paul. Æginet., iii. 427.

contain it, and animal and vegetable substances moistened with a solution of camphor grow mouldy as readily as if water were employed alone. Camphor does not interfere with the germination of seeds.

On Animals.—Menghini found that the effluvium of camphor is fatal to many of the articulata, when they are inclosed with this substance in a glass vessel with a paper cover, pierced with holes so as to admit the air. Beetles, bedbugs, ants, wasps, fleas, spiders, and lice are sensibly affected by its emanations, which ultimately destroy them. According to the same experimenter, birds, such as sparrows, swallows, chickens, pigeons, &c., are all more or less acted upon; some of them are seized with epileptiform convulsions, others with a sort of intoxication or madness, and still others fall into a state of stupor, or give signs of distress, with stertorous breathing, hiccup, or frothing at the mouth, while in some cases a purgative, emetic, or diuretic action is manifested. Most frequently the death of the animal speedily follows these symptoms; and, on dissecting them, various signs of inflammation are detected in the meninges, lungs, heart, and intestines, and the blood is in some instances fluid, but in others coagulated. Monro produced sluggishness, syncope, and a marked slowness of the heart's movements, when camphor was given to frogs, either by the mouth or applied to the skin. Carminati placed frogs under glasses having a capacity of four cubic inches, along with a piece of camphor weighing three drachms, and at the expiration of fifteen or twenty minutes the animals became agitated, breathed laboriously, and died convulsed.2

Camphor is very generally fatal to the intestinal entozoa of man. One of the most familiar uses of this substance is to prevent the attacks of moths upon woollen fabrics, by sprinkling it among them, or by inclosing them in chests made of camphor-wood. This well-known fact appears not to harmonize with the statement made by numerous authors, that camphor does not act injuriously on the tineæ

that destroy wool.

Experiments upon dogs and other animals have been made by numerous observers, whose results are comprised in the following summary. Five or ten minutes after a dog has taken from one and a half to two drachms of camphor, dissolved in oil, the animal grows restless, foams at the mouth, makes violent efforts at swallowing, his gait is unsteady, and he soon lies down; but shortly afterwards, and as if aroused by an electric shock, he starts up, vomits, or attempts to do so, and again lies down. These acts occupy about a quarter of an hour. He then begins to tremble, and is convulsed, throwing his head backwards; his movements grow disordered; he whines, and tries to escape; his throat becomes obstructed with frothy mucus; his eyes are generally fixed, and the pupils dilated. The breathing meanwhile is anxious, and the pulse feeble. This convulsive state is generally followed by repose, during which the heart beats more feebly and less frequently, while the nose is cold and the whole body trembles. Another and more violent convulsive paroxysm follows, which is again succeeded by an interval of repose; but the spasms are

² DIBU, loc. cit.; MURRAY, App. Med., iii. 474.

speedily renewed, respiration grows more labored, and the animal dies. During the progress of these phenomena, vomiting, with a discharge of urine and fæces, generally takes place. Their duration is usually from two to three hours; but if they do not terminate fatally, recovery speedily follows. When solid camphor is administered, the animal shows greater signs of suffering; he drinks greedily, and his pulse becomes quicker, but death ensues at a much later period than in the experiments previously described; not usually, indeed, for many days, and not from direct poisoning, as it does when camphor is administered in oily solution, but indirectly from inflammation of the stomach. This organ is found on dissection to be extremely vascular, and softened or ulcerated. No other cadaveric changes have been observed which serve to illustrate the cause of death. The odor of camphor is detected in all the fluids and secretions after death; the heart is found distended, and its lining membrane, as well as that of the bladder, and the membranes of the nervous centres, are stained by the dark and fluid blood. Scudery found vivid traces of inflammation in the genito-urinary apparatus of a dog which had been poisoned with camphor, and had suffered severely from strangury during the progress of the experiment. Tiedemann and Gmelin could not recognize the smell of camphor either in the chyle or in the urine, but all observers have detected it in the expired breath.

When camphor is given in small doses to horses, oxen, sheep, &c., it is said to quicken the pulse and cause general excitement, and blood drawn from a vein flows more strongly and is redder than before the experiment. Larger doses, according to Moiroud, develop exalted sensibility and induce convulsions; and still larger quantities produce a greater degree of morbid sensibility, frequency of the pulse, convulsive paroxysms, and at last insensibility and an apoplectic condition.

The only conclusions which seem to be fairly deducible from the foregoing facts relative to the mode of action of camphor are these: 1st, that in poisonous doses it destroys life in the lower animals by depressing the vital actions of the system; and, 2d, that in moderate doses it acts as a stimulant to the nervous and circulatory systems. Some experiments of Scudery have been adduced by Dieu² to prove that camphor and opium are antagonistic. The experiments, indeed, showed that the poisonous effects of camphor are moderated by medicinal doses of opium. But the assumed interpretation of this fact could be sustained only by showing that the dose of the latter agent, if administered alone, would have been sufficient to produce the poisonous effects of opium. For otherwise it is only what might have been expected, that a moderate or stimulant dose of opium would tend to counteract an excessive or sedative dose of camphor; just as a small quantity of alcohol will moderate the secondary effects of an overdose of the same agent. So Scudery himself found that rabbits withstand for a long time the influence of poisonous doses of camphor dissolved in alcohol. No two agents can be considered antagonistic which do not produce opposite effects when given in the same relative

DIEU, loc. cit.; MURRAY, App. Med., iii. 474.

doses. But the different action of small and of large doses of camphor will be more fully illustrated in the sequel.

On Man.—Local Action. When camphor is rubbed into the unbroken skin, it produces a sensation of heat or burning, but seldom causes inflammation. It excites severe pain, however, when applied to the denuded cutis. The local action of camphor on mucous membranes is more decided. A piece held in the mouth for half an hour excites redness, heat, swelling, and pain, and if retained there long enough, would probably also ulcerate the surface with which it is in contact, as it is known to do when it acts upon the gastric mucous membrane. When powdered camphor is sprinkled upon indolent and unhealthy ulcers, it produces a contraction of the tissues and hastens the cure. The local operation, therefore, of camphor on healthy parts is that of a stimulant and irritant.

Constitutional Action. A diversity of opinion regarding the operation of camphor has long prevailed in the medical profession, a diversity quite as great as in the case of opium, and which would probably have engendered no less hostility and bitterness between the opposite advocates, were not the utility of the former medicine so far inferior. Like opium, camphor is held to be a stimulant by one party and proclaimed as a sedative by another, and examples without number are cited by each to demonstrate its own thesis. This conflict of opinion may be harmonized, if, instead of accepting the deductions of authors as the elements of a judgment, the grounds of those deductions are themselves analyzed; for then it appears that, as in the case of opium, alcohol, and various other agents, the action of camphor varies with its dose, and further, that in certain doses its primary and secondary effects are of an opposite character. These statements will be more readily appreciated after a review has been taken of the facts upon which alone it is possible to base an enlightened and impartial judgment.

One of the earliest illustrations of this subject is furnished by Hoffmann.¹ The patient was a hypochondriac, to whom two scruples of camphor dissolved in oil were administered by mistake for spermaceti. Hardly was the dose taken, when the patient was seized with vertigo, his extremities grew cold, and his countenance pale; his pulse was small and very slow; there was præcordial distress, and a cold sweat broke out upon the forehead; the mind became disturbed, and the patient laughed loudly at one moment, and the next was depressed with a dread of dying. Volatile and stimulating liquids held to his nose increased the intoxication; the patient's limbs seemed weary, and when he boasted of his strength, he staggered in walking. In the course of two hours he began to come to himself, but was feeble and relaxed; a copious perspiration with a warm skin and frequent pulse followed, and he enjoyed a good night's rest.

Whyte relates the case of a gentleman who, in order to know what effects a large dose of camphor would have, swallowed half a drachm dissolved in oil. His head became confused, he staggered as he

¹ Consult. et Respon. Med., cas. xix.

walked, and a dark cloud seemed to come over his eyes, but upon going into the open air these symptoms began to abate, and in a few

hours passed away.1

A very similar case is recorded by Griffin. Two scruples were taken, and caused, besides the burning sensation at the pit of the stomach, a lessened frequency of pulse, vertigo, intoxication, slight shivering and a pale countenance, staggering, and finally sleep.2 The same writer states that he gave half a drachm to another person. The pulse did not change at first, but after the lapse of two hours there was nausea with giddiness and dimness of vision; then active vomiting, after which the pulse became frequent, small, and feeble, with general debility, which continued for some time, especially in the lower limbs. According to Callisen, this medicine given to persons laboring under a malignant bilious fever, in doses of from ten grains to half a drachm every third or fourth hour, and in some cases every hour, produced in all of them a marked subsidence of the heat and paleness of the surface, dimness of vision, frequent and oppressed breathing, a less frequent but an unequal and intermittent pulse, and occasionally rigors. But these symptoms, which arose suddenly, subsided rapidly, and did not last more than half an hour; they were followed by a stronger and more regular pulse, easy respiration, warmth and redness of the skin, and brightness of the eyes. Pouteau also relates the case of a puerperal female who, in the course of half an hour, took a drachm of camphor to relieve the pains of colic. She was seized with a deathlike coldness and paleness which lasted nearly an hour.

One of the best related cases on record illustrative of the present subject, is that of Alexander, who, in order to study the effects of camphor, took two scruples of it at a dose suspended in syrup. He soon experienced an unusual lassitude and depression of spirits, accompanied with frequent yawnings and stretchings which stole upon him by degrees, till at the end of three-quarters of an hour they became extremely troublesome. His pulse had fallen from 77 to 67. "Soon after this," he continues, "my head grew so very giddy that it was with great difficulty I could walk across the room, when feeling myself, as I imagined, stifled, I imagined the fresh air would remove that symptom, and therefore opened the window and looked out; but everything in the street appeared to me in the utmost tumult and confusion; in which, imagining that I was involved, I felt myself in danger of losing my balance and tumbling from my position. I therefore staggered from the window to my bed, and having a book with me, read several passages of it; but had no distinct idea of any one sentence, and far less could I connect two or more of them together, so as to comprehend the meaning of the author. At last, being able to read no longer for the tumultuous motion which I perceived among the letters of the book, and finding it had no power to divert the attention of my mind from the uneasy sensations which dis-

Observations, &c., 2d ed., p. 366.

² Murray, Apparat., iii. 479, and Griffin, loc. inf. cit.

³ Ibid., p. 481. ⁴ Ibid., p. 483.

⁵ Experimental Essays, Lond. 1768, p. 128.

use of any part of the furniture of my own room, and every object on which I cast my eyes appeared as strange and new to me as if I had

only that moment begun my existence.

"Between eight and nine o'clock, feeling myself still very much confused, I went to bed, and soon after fell into a very calm and easy sleep, which continued till next morning with much less interruption No unpleasant symptoms remained on the following day,

except great soreness and rigidity over the whole body.

This case, which is almost unique in the minute and complete detail of its phenomena, is also different from any other in the peculiar disturbance of the nervous system which it displays. Neither the term stimulation nor sedation expresses the character of the symptoms taken in their aggregate, and such, indeed, was the judgment of Alexander himself concerning it. Nevertheless, if we set aside those of its phenomena which indicate neither an excitement nor a depression of the system, but their perversion merely, the remainder clearly demonstrate a diminished energy or tone in the circulatory and nervous systems and in their dependencies. Of such symptoms are these; depression of the pulse, lassitude, giddiness, accompanied with debility, fainting, &c. They were the primary effects of the medicine, and were followed ultimately by heat of skin, frequency of the pulse, and headache.

The well-known case of Cullen's patient should find a place here. She took forty grains of camphor, and became insensible; her pulse was very weak and small, her breathing hardly to be observed, and her whole body pale and cold.1 Duteau relates that one drachm of camplior was given to a girl in a very severe colic. After taking it the pain soon became easier; but it brought on such an extreme cold over all her body as resembled death, and which could hardly be removed by the aid of warm clothes wrapt around her, and the internal use of wine.2

An instructive case was published by Wendt relative to a man who swallowed nearly four ounces of tincture of camphor containing more than two drachms of the latter substance, and who nevertheless recovered. Dieu, who cites this example, very plausibly attributes the safety of the patient to the stimulant effects of the alcohol in which the camphor was dissolved.

Trousseau performed some experiments in his own person for the purpose of elucidating the action of this medicine. After a dose of ten grains the pulse fell from 72 to 64, and then to 60; an acrid coldness was felt in the stomach, and at the expiration of an hour, although this symptom remained, there was a general sense of comfort. A dose of twenty grains produced the same effects in a more marked degree. A third dose of thirty six grains occasioned a still stronger sense of cold, which seemed to pervade the whole trunk, but was especially felt in the esophagus and the stomach. At the end of half an hour the pulse fell from 72 to 60, and there was a slight sense of heaviness. "The anaphrodisiac action was unquestionable." At the expiration of two

¹ Mat. Med., ii. 295.

² ALEXANDER'S Essays, p. 141.

hours the sense of coolness in the bowels was no longer felt, but in its stead a slight degree of warmth. Three hours afterwards the condition was the same as before the experiment. In these trials of the medicine, and especially in the last, the reader will be struck by the absence of several symptoms which occurred in all of the other cases in which so large a dose of camphor had been taken, viz., the coldness of the extremities, the confusion of mind, the vertigo, the weariness, and the debility. These and various alarming ataxic symptoms were produced in the person of Alexander by a dose of camphor only four grains larger than the last taken by M. Trousseau with such slight effect.

M. Aran reports a case¹ which goes still further to demonstrate the exceptional character of the symptoms described by M. Trousseau. The patient was a nervous and delicate female affected with neuralgia and various indefinite pains and sensations in different parts of her body. Two scruples of camphor suspended in water were given her by enema. Hardly had two minutes elapsed when the patient complained of a faintness which seemed to threaten dissolution, and of a severe pain in the belly. Almost immediately afterwards she became insensible and was convulsed; the limbs were contorted, the head thrown backwards, the face purple, and the lips covered with foam. The fit lasted twelve minutes. Soon afterwards M. Aran found her in the condition described, and with the eyes half open, the pulse between 70 and 80, and extremely small, the extremities cold and livid, and the respiration suspended. The patient regained her consciousness on water being sprinkled on her face, but complained of pain in the abdomen and a sense of suffocation which lasted several hours. purgative enema was administered and strong coffee prescribed, but very soon after, although she had meanwhile evacuated a portion of the camphorated enema, the former symptoms were renewed, and were mitigated by a stream of cold water falling upon the head. The coldness and insensibility persisting, the patient was placed in a warm bed and wine with canella administered. From this time reaction came on, the trunk grew warm and even hot, the pulse rose and became frequent (88-92), and in four hours after taking the camphor the only remaining symptoms were fever, redness of the face, heat of skin, and a sense of weariness and debility, which by the morrow were completely dissipated. The patient had no recollection whatever of the incidents of this attack.

Another example of the sedative effects of large doses of camphor is related by M. Orfila.² In this case a dose of thirty grains was administered in clyster to a man of nervous temperament. A few minutes afterwards the taste of the medicine was perceived in his throat and within a quarter of an hour a sense of uneasiness and anxiety took possession of him. On rising to walk he seemed to move over the ground without touching it, and his step was wavering and tottering. His face was pale, his eyes haggard, and his features pinched. A slight sensation of coldness pervaded the whole surface

Bull. de Thérap., xli. 164.

of his body, and a sense of numbness the scalp and back of the neck. In some places the skin was cool and moist, the pulse was small and feeble, and there seemed to be a disposition to syncope, &c. Wine

contributed greatly to his recovery.

The same author quotes from Schaaf the case of three children, to each of whom about thirty grains of camphor in powder were given. The first symptom observed was extreme paleness of the face with a fixed and stupid look; then followed delirium, thirst, vertigo, vomiting, convulsions, and insensibility. The skin was cool, pale, and moist. One of the children, a delicate and sickly infant, eighteen months old, died from the effects of the poison. The only other recorded case in which camphor was the cause of death, and in this instance, as in the last, by an indirect effect, is that of a woman four months gone with child, who took three drachms of camphor dissolved in brandy at a single dose. It produced the usual symptoms, fol-

lowed by an abortion which proved fatal.

On analyzing the cases of which the more important details are given above, there is found to be a remarkable agreement in their symptoms, the character, if not always the degree, of the disturbance being identical in all of them. The cases are thirteen in number, in nine of which the dose of camphor taken varied from two scruples to a drachm; in the remaining four it averaged about half a drachm. nine, of which the condition of the nervous system is described, vertigo, faintness, confusion of ideas were present, and either delirium or insensibility, debility, staggering, and convulsions. The temperature of the body is described as cool in all of the cases in which its condition is mentioned; the face was pale and the pulse either infrequent or small and feeble. This striking uniformity in cases observed in places remote from one another leaves no doubt upon the mind as to the modus operandi of camphor given in doses of from twenty to sixty grains. The medicine in these doses is proved to be a direct and powerful sedative, but transient in its operation. This is its primary and principal quality; indirectly, and chiefly perhaps where there is an undue nervous susceptibility, it creates in addition ataxic phenomena; and, lastly, and indirectly also, these effects are followed by some degree of febrile reaction, which is also of brief duration. no instance does camphor seem to have directly caused the death of a healthy person.

There are several cases upon record which may be regarded as transitional between those above described and those which are next to be considered—cases in which, although the total dose of camphor taken within a short time was large, yet the amount taken at any one moment was small. The first of these is the case of Dr. Eichhorn, related by himself.² He had powdered some camphor with sugar to relieve a cold in the head, and in the course of three hours took a

Bull. de Thérap., lvi. 343. Other late examples of the toxical action of camphor will be found in Lancet, May, 1857, p. 475; Am. Jour. of Med. Sci., July, 1858, p. 284; Times and Gaz., Dec. 1858, p. 645; Br. and For. Med.-Chir. Rev., Apr. 1861, p. 550; Dublin Quart. Jour., May, 1861, p. 467.

2 Am. Jour. of Med. Sci., xi. 248.

teaspoonful from time to time without reflecting upon the quantity he was swallowing, but which was really about two drachms. He then went to bed somewhat alarmed lest he were poisoned, but for half an hour suffered no inconvenience. Presently, however, he began to feel warmer and warmer until he experienced a burning heat; his pulse grew very frequent, but there was no uneasiness in his head. He says: "I never felt better; never were my ideas more lively or clearer; it appeared as if my intellectual powers were increased, and certainly champagne never brought on a more pleasing intoxication. In this situation I passed about an hour and a half, when my skin began to grow moist; soon after my pulse became slower and I fell asleep. The next morning I awoke miserably weak, the sweat having penetrated to the lower side of the feather-bed, and my shirt and clothes were drenched."

The other example is reported by Dr. Reynolds,' of Brockville, Canada. "Mr. C., set. 20, of a healthy constitution, and full habit, was standing in a shop where a druggist was breaking up cakes of camphor to put in bottles. He began to eat the crumbs of camphor, and unconsciously swallowed, bit by bit, probably from one to two drachms in the course of a few minutes." He suddenly experienced a degree of headache, and went out into the street, where he met a friend, to whom he proposed a rubber of whist. He felt unusually clear-headed; but soon after sitting down his gestures and conversation became very strange and wild. "Leaving the room suddenly, he retired to his bedroom adjoining, and returned to the no small astonishment of his friends, naked, and dancing wildly about, and attempting to jump out of the window. His pulse was 180 and small; conjunctiva injected; pupil not much dilated, scarcely sensible to light; countenance pale and haggard; breathing hurried, and at times greatly labored; a frequent desire to make water, with some pain in the course of the spermatic vessels; urine quite clear, but having, as well as the perspiration, a strong odor of camphor; and a clammy sweat breaking out over the body." Opium was administered, which, of course, complicated the subsequent phenomena. The patient described the sensation while under the influence of camphor as "most exhilarating, but gradually becoming oppressive."

The contrast between the phenomena of these cases and the cases of the first series is very striking. When the medicine was taken in small doses frequently repeated, and during several hours, the effects were unequivocally stimulant, of an agreeable nature, and followed by little if any depression; but when nearly the same quantity of the drug was taken, and also in divided doses, but within a much shorter time, the stimulant effects were not only predominant, but so active as to be almost violent, and were immediately followed by sedation and

ataxic phenomena like those in the first series of cases.

There is still another case on record very closely resembling the one last narrated in its symptoms, but in which the whole dose of the medicine, two scruples, was taken at a single dose, and fasting. Pur-

¹ Month. Jour. of Med. Sci., Sept. 1846.

kinjé is its reporter.¹ The first effect of the medicine was to excite such a restlessness that the experimenter could not remain in bed. There was then a singular sense of lightness in the limbs. Sensibility to outward impressions seemed rather blunted. The attention could not be fixed. Ideas flowed through the mind in a swift and crowded stream, and the sense of personal identity was lost. These symptoms were temporarily relieved by vomiting, and for an hour the mind was applied to business. But the sense of sight was feeble and uncertain, while that of hearing retained impressions. At last consciousness was lost, and a copious warm perspiration broke out. The experimenter had an injected countenance, and experienced some convulsive movements, and lay for half an hour breathing slowly. After awaking, he was for a long time unable to recognize the familiar persons and objects around him, but he experienced no exhaustion.

When an attempt is made to determine the action of medicinal doses of camphor upon the healthy system, a twofold difficulty presents itself; small doses have seldom been submitted to scrupulous experiment for the object in question, and the results of clinical observation cannot, in general, be legitimately invoked to demonstrate or even to illustrate the physiological mode of action of a medicine. Yet if the effects produced upon the sick should uniformly correspond with those produced by like doses upon healthy subjects, the mode of action deduced from the latter class of facts is rendered still more probable

by inferences from the former.

The first series of experiments to be adduced is that instituted by Jörg.² To begin with the smallest dose, this observer employed a solution of one grain of camphor in eight drops of alcohol, of which the least quantity given was four drops; this same number was added on every repetition of the dose, until three and a half grains of camphor were given at once. In a second series, the first dose was four grains, and the last twelve grains. In a third, fourth, and fifth series the dose varied from one-half a grain to eight grains; and finally, in five concluding series the dose rose gradually from one-half a grain to five grains. The fractional doses are not reported to have exerted any distinct influence, but a single grain did, in several instances, give rise to distinct phenomena which shadowed forth the more perfect effects of the larger doses. Not to dwell upon these in detail, it suffices to present the general conclusions to which the entire series of observations led. Jörg states them to be as follows: Camphor acts as a stimulant to the brain and intestinal canal, besides exciting the urinary and genital organs, the skin, and the vascular system. Hence it is indicated in diseases whose predominant symptom is debility, particularly where this state is maintained by atony of the intestinal canal. The opinion that camphor acts as a sedative on the organs of generation, and that therefore it is directly indicated in morbid excitement of these organs, is regarded by Jörg as belonging probably to the fabulous period of medicine. The reader will have seen that this is the appropriate action of the medicine in doses of thirty grains and

¹ RICHTER, op. cit., Suppl. Bd., p. 442.

² Materialien, &c., p. 230 et seq.

upwards. Further proof, if necessary, might be adduced. Alibert cites the case of a nymphomaniac patient whom he cured by a drachm of camphor, and Esquirol successfully treated hysterical nymphomaniacs with the same remedy.' But these facts do not conflict with those of Jörg, and others which prove that camphor in small doses is an excitant of the generative organs.

According to Sundelin,² camphor in small doses raises the pulse, rendering it both fuller and more frequent, diffuses a sense of warmth from the stomach throughout the whole body, and augments the secernent action of the skin. This author seems clearly to have apprehended the conditions under which the apparently opposite actions of the drug are manifested, and which it is a main object of this discussion to illustrate. "Small doses," he remarks, "demonstrate its stimulating

qualities clearly; but as the quantity administered is greater, a condition is developed which at first sight seems to be the very opposite of excitement," and which the author attributes to congestion of the

brain.

Purkinjé, after taking a dose of twelve grains, in bed and fasting, experienced heartburn, a pleasant and moist warmth over the whole body, a general and agreeable excitement of the nervous system which was particularly distinct in the skin and muscles, a peculiar excitement of the brain, and above all a feeling of inebriation. These symptoms continued for an hour and a half, and were dissipated by the customary occupations of the day. They were not followed by

any sense of lassitude.

Scudery' found that in a few minutes after taking from ten to fifteen grains of camphor, the pulse grew more frequent and tense, the cheeks became red, the skin dry, the head ached, the eyes were bright and sensitive to the light, and the genital organs were excited. same results were obtained on five successive trials, and were confirmed by those of Pasquali and Mezzotti. Scudery afterwards took a scruple of camphor dissolved in an ounce of alcohol, and experienced the same kind of symptoms, but a much higher degree of excitement. The same experimenter took two scruples of camphor, and in a few minutes afterwards two drachms of nitre dissolved in water. At first the pulse fell, and there were nausea and chilliness, but in a half an hour it rose again, and there was fulness of the head, with redness and Another dose of nitre like the first was then taken, which produced nausea, and at the same time dispelled the other symptoms. In the last of these experiments the sedation is attributed to the nitre alone, but was doubtless owing in part also to the large dose of camphor.

The general medicinal characteristic of camphor is, according to Sachs and Dulk, that it excites the general sensibility, but in a particular manner the sensibility of the vascular system, and Murray declares that it is evidently stimulant. Vogt is of opinion that if we add the results of physiological experiment to those of clinical ob-

¹ Am. Jour. of Med. Sci., Jan. 1844, p. 190.

^в Rіснтев, ор. cit., Suppl. Bd., р. 442.

^{*} Handworterbuch, i. 674.

² Heilmittellehre, il. 139.

⁴ Jour. des Progrès, xvii. 78.

servation, no doubt can remain of the stimulant qualities of camphor. He thinks, indeed, that no other stimulant of the same class is comparable with it, and that in the extremest state of debility camphor is sometimes successful when all other medicines are fruitlessly employed. Camphor, says Richter, evidently belongs to the class of oleo-ethereal medicines, and like these acts as a powerful stimulant. "It is by far the strongest and most searching medicine of its class, from all the rest of which it is distinguished by its rapid, durable, and widespread action on the nervous system. When the powers of life are low, and the skin is moistened with a cold sweat, it is often the most efficient of remedies." Oesterlen, and also Neumann, contend for the excitant properties of camphor. The latter declares it to be diaphoretic and antispasmodic, and that, in fine, it is one of the most thorough and active of stimulants. Mitscherlich infers from a review of numerous recorded experiments, that the sedation produced by very large doses of camphor depends upon its local action within the stomach, while the subsequent excitation is due to the absorption and circulation of its particles. Pereira affirms that in moderate doses it exhilarates and acts as a vascular excitant. Dr. Chapman is of opinion that "few medicines more unequivocally display their stimulant powers;" and Eberle' states that he has several times taken scruple doses of camphor, and found the pulse slightly increased in fulness, while he experienced giddiness and fulness about the head.

The following appear to be legitimate deductions from the whole of the inquiry which has now been made into the action of camphor on

the healthy organism:—

1. The direct and primary action of large doses of camphor (gr.xx. to gr.lx.) is a powerful but not a permanent sedation of the nervous and vascular systems, followed by ataxic phenomena, and remotely by slight and very transient febrile excitement.

2. The direct and primary action of small or medicinal doses (gr. j to gr. xv) of camphor is to stimulate and excite the nervous and vascular systems, and through them the whole organism; but the excitement is of short duration, and is not followed by exhaustion or depression.

3. The influence of camphor upon the sexual organs is subordinate

to its aforementioned modes of action.

6. The transient operation of this substance explains the high grade of excitement produced by small doses repeated in close succession.

The sedation by large, and the stimulation by small doses of camphor, together with the transient duration of its action, resemble the effects of ether and chloroform more nearly than those of any other medicine, and the analogy is more complete if we have regard to the anodyne qualities of camphor for which it has at all times been chiefly used. Its control over pain never amounts, however, to the production of anæsthesia, unless we accept as proof of the fact the experiments of Fonssagrives, in which he produced complete insensibility to pain in animals by causing them to inhale air highly charged with the vapors

¹ Op. oit., iii. 364.

² Materia Medica, &c., p. 345.

³ Archives Gén., 5ème sér., ix. 561.

of camphor. Some doubt, however, attaches to the interpretation of these experiments; for the apparent narcotism of the animals may have been due to a partial asphyxia. It will be seen in the sequel that the ordinary remedial effects of camphor can only be explained by admitting it to possess a stimulant power. Of all these effects the two most prominent and demonstrable are its control over asthenia and ataxia. The latter, when connected, as indeed it generally is, with prostration of the powers of life, is as real, if not as clear, a sign of debility as the purer form of this condition which is attended with, or which tends to, resolution of all the functions, and the medicine which raises the system out of its prostration and disorder is well entitled to be called a stimulant. This state is not inaptly illustrated by the familiar phenomena of delirium tremens, a disease in which there is excessive muscular and nervous action, and which apparently is one of equally excessive power. Yet the appearance of energy in its symptoms is deceptive, for, with all his violence, the patient is actually weak; he has a feeble pulse, and sinks at once under debilitating treatment. His tumultuous symptoms are, on the contrary, reduced to order most certainly and speedily by direct diffusible stimulants, the best of which is alcohol, and next to it opium. Even the very substance under consideration has long ago been vaunted as efficacious in the treatment of this disease.' If, therefore, there is reason to class camphor among sedative medicines on account of its effects in this and analogous conditions, alcohol must with no less propriety be placed there also. In truth, ataxia is usually connected with debility, and the agent which relieves it does so by imparting strength and tone to the disordered and weakened system, and is of right called a stimulant.

REMEDIAL EMPLOYMENT.—If such difficulties as have been pointed out arise in determining the normal operation of camphor, the labor of surmounting them is nevertheless but light when compared with that of clearing up the inharmonious and contradictory statements which have been made respecting the remedial operation of this substance. The greater number of physicians appear to have employed it in accordance with a hypothetical notion of its operation rather than according to the conclusions of experience, and so generally to have combined other medicines with it in prescription, as manifestly to render its alleged effects the expression of a prejudice, or else a compound result of which it is impossible to assign a proper share to the substance in question. Could we ascertain precisely how far camphor has contributed to the mitigation or cure of diseases, the nature of the diseased states it is fitted to remove, and in what doses it effects its purpose, the art of therapeutics would be perfected much more than by the most ingenious discussions concerning the manner in which it brings about these results.

Adynamic and Ataxic Fevers.—Of all the diseases in which the use of camphor has been found beneficial by the most eminent physicians, none stands so prominently forward as the class referred to; and if any other reasons than have been already adduced were required to

demonstrate the stimulant qualities of the medicine, this agreement of testimony in regard to the point in question would be conclusive. One of the earliest authorities on the subject is Diemerbroeck, who classes it along with the aromatics useful in the plague, and represents Mindererus as declaring it to be one of the most powerful of alexipharmics in this disease. Huxham, too, expresses himself thus: "I think that in these putrid pestilential fevers nothing more certainly promotes diaphoresis than camphor, with this further advantage, that it by no means heats so much as volatile alkaline salts. It is, besides, vastly serviceable in quieting the erethism and bringing on composure of spirits when opiates fail. Indeed, when joined with an opiate, it is the most certain sudorific in nature." Pringle's appears to recommend camphor chiefly for the purpose of regulating disordered nervous action, for he sometimes directs it in conjunction with serpentaria and sometimes with nitre. Hildebrandt regards camphor as the most effectual remedy in the nervous stage of typhus, by means of its powerful action on the debilitated vital forces, the nervous system in general, and the skin.

The stimulant character of this medicine may further be inferred from the opinions of several eminent authors of its use in malignant fevers. The emphatic sentence of Ettmüller is, "Remedium in febribus malignis sine camphora est instar militis sine gladio." Of the same purport is Haller's description of a variolous epidemic in which all other medicines failed, and the mortality became general, when this physician resorted to camphor. He prescribed it in divided doses of about fifteen grains a day, given in solution; and under its use the hemorrhagic spots disappeared, as well as the alarming symptoms that accompanied them. Hoffmann' also speaks in like terms of the remedy, and employs this emphatic language: "We are of opinion that nature has produced no one substance more prompt and powerful in removing the malignant elements of disease; hence it deserves, and has a right, to be called the prince of alexipharmics." Richter asserts very precisely that, "in general, it is useful in the last stages of such typhoid affections as were inflammatory at the outset, whenever it is important to maintain the activity of the skin and nervous system, to overcome their depression when the exhausted vascular system is unable to bring about critical discharges, and when, especially, irritability and sensibility are both unduly depressed. The signs of this condition are a small, weak, tremulous pulse, muscular debility, quiet delirium, floccitation, subsultus, a cool, dry, parchment-like skin, or a cold, sluggish, and moist integument." Joseph Frank enumerates' debility, softness, and diffluence of the pulse, without irregularity, coldness of the extremities, which are covered with a viscid perspiration, a livid countenance, and dark ecchymoses of the skin, as indications for the use of this remedy. Sachs, Sundelin, and Strumpf do but repeat the detail of symptoms above given as calling for the use of camphor,

DE PESTE, lib. iii. cap. v.

Diseases of the Army, pp. 135 and 267.

⁴ Du Typhus, &c., Trad. de Gasc, p. 208.

[•] Op. cit., iii. 368.

² Essay on Fevers, p. 120.

⁶ Op. cit., § xii.

⁷ Pathol. Méd., i. 250.

and Neumann only subjoins the necessity of combining an external with the internal use of the remedy when signs of gangrene display themselves, adding that under these circumstances camphor is the only remedy on which reliance can be placed. Burnet recommends it along with carbonate of ammonia and alcoholic stimulants when the temperature of the surface is below the natural standard, the belly tympanitic, and the powers of life at a low ebb. In his excellent history of the typhus epidemic which he observed at the Philadelphia Almshouse Hospital in 1836, and which the present writer had also the opportunity of studying, Dr. Gerhard observes: "Camphor was certainly among the most useful and powerful of our remedies. We used it largely in the severe cases, especially those in which the ataxic nervous symptoms were very marked, and we had no reason to repent of its employment. In general, there was a marked diminution of some of the most prominent and harassing symptoms. We gave the camphor in emulsion in doses of five grains every two hours, and in enema in doses of a scruple. The immediate effect was the lessening of the subsultus and tremors, for which it was chiefly administered. and sometimes the diminution of delirium. In some cases we possessed a complete control over the subsultus, which was immediately checked by an injection containing a scruple of camphor. It would cease for some hours, but afterwards return with nearly its former severity. Still, camphor was a useful palliative, and, like most remedies of its class, acted as a useful balance-wheel in preserving the harmony of the system until the disease had passed through its natural The camphor frequently acted powerfully as an anodyne, when sleep had been interrupted by the previous disturbance of the nervous system."

Not to add unduly to the amount of testimony now produced, it need only be further remarked, that all of the authors who have had an opportunity of observing the operation of camphor in the treatment of low forms of continued fever, concur in recommending it as one of the most effectual means of combating adynamic and ataxic symptoms. Its control over the latter, no doubt induced an erroneous estimate of its mode of action. When the power of the remedy to allay disordered action of the muscular and nervous system became apparent, it was, by some writers, inconsiderately inferred to possess intrinsic sedative qualities. The circumstance was too often overlooked by them, that the disorder in question was the consequence of impaired strength. Such a condition could only be relieved by stimulants, by medicines having the power of raising the depressed system to its natural level, and when this was once accomplished, either by camphor or by diffusible stimulants, the agitation was appeased.

Inflammatory Diseases.—Several of the writers who contend for the sedative properties of camphor, appeal to the authority of Hoffmann and other eminent physicians in support of their doctrine. But when the testimony of these witnesses is carefully sifted, it does nothing less than sustain the dogma in favor of which it is invoked. Without

A Pract. Treatise on the Typhus, &c., p. 196.

entering upon a critical and detailed examination of these alleged evidences, a single one may be adduced to illustrate their character. Hoffmann, for example, is quoted as contending for the usefulness of camphor in pleurisy, phrenitis, metritis, &c.; but this author expressly insists upon the union of nitre with camphor in these affections, regarding the combination as diaphoretic and sedative; and he emphatically states in the very same paragraph, that he could not easily be persuaded to administer this substance alone, in inflammations of a high grade (quibus maximus æstus junctus est). But by the union of the two remedies, he conceived that while the one opened the pores, and the peccant humors (materia vitiosa) were expelled by the other, a combination was obtained capable of producing a salutary crisis in the disease. A not dissimilar union exists in the well-known Dover's powder, which is, indeed, also used for the very purpose which Hoffmann had in view.

If other writers of authority counsel the use of camphor in the phlegmasiæ, their advice is carefully limited by an explanation of the peculiar conditions in which they conceive the medicine to be useful. It is when, as so often happens, and, for example, during epidemics, inflammatory diseases assume a typhoid type. Under no other conditions whatever, of these diseases, is there any reliable evidence of the utility of the medicine in small or ordinary doses. The affections which are generally alleged to have been rapidly subdued by its use, are pleurisy, pneumonia, &c. But with the knowledge now possessed of these diseases, it is certain that the statements are groundless which attribute to camphor the power of curing them. The only exceptions to this judgment, are certain examples of acute pulmonary and other inflammations which seem indeed to have owed their speedy cure to the remedy under examination; but when the quantity of it employed is taken into consideration, the apparent discrepancy disappears; for it was no longer given in small or stimulant doses, but from forty to sixty grains of it were administered in the twenty-four hours.2 In such doses the sedative action of the medicine became developed.

Chronic Inflammation.—According to Richter camphor is useful in chronic rheumatism; especially when the nervous element of the disease is prominent, and when the affection is erratic, or threatens the internal organs. He directs it to be given in large doses, such as one or two drachms in the twenty-four hours. In gout, also, when the same element predominates, and towards the close of the attack, Richter considers this medicine peculiarly adapted to perfect the cure. He also recommends it in combination with opium, as an effectual sudorific. In fact, this formula is well suited to fill the same place in the treatment of asthenic affections which the Dover's powder holds in that of purely inflammatory diseases.

Spasmodic Affections.—Several authors ascribe a curative power to camphor, in whooping-cough, obstinate hiccup, chorea, and even epilepsy. Sundelin states it to be useful in the two last-named affections when they arise from the suppression of cutaneous eruptions, or from the

¹ Op. cit., § zvii.

metastasis of rheumatism. Berends recommends it in those cases of epilepsy in which the paroxysms occur at night, and directs one or two grains to be taken at bedtime. The efficacy of such a prescription may very well be doubted. Other affections, such as nervous headache, nervous palpitation of the heart, spasmodic dysphagia affecting susceptible persons, are stated by several authors to be amenable to camphor. But in this class of disorders, the original and principal affection on which the minor ones depend must not be lost sight of, for against this main source of the morbid phenomena, camphor may prove ineffectual. When the affection is inflammatory in its nature, the medicine, as Mitscherlich observes, is more hurtful than useful, unless, indeed, the erethism have its starting point in the sexual organs. Camphor has been used to advantage as an antidote to strychnia. In several cases reported by Dr. Arnett' and Dr. Pritchard, it acted with such promptness when the symptoms were most violent, as to leave no doubt of its efficacy.

Affections of the Sexual Organs.—In satyriasis, furor uterinus, and hysteria libidinosa, camphor is, according to Richter, a capital remedy. "If no inflammatory symptoms exist, or if these have been allayed by depletion, the medicine ought to be given in heroic doses, or, if there be vascular excitement at the same time, it should be conjoined with nitre. In one case it was successfully given in drachm doses four times a day. Müller cured an irrepressible venereal desire and excessive priapism in a clergyman, by prescribing camphor in ascending doses, until a drachm was taken daily. Richter successfully employed large doses of the medicine for a patient affected with sleep. walking and priapism, and who had formerly been addicted to onanism, and experienced convulsive attacks under the excitement of sexual lust. When persons who cannot be weaned from the habit of self-pollution, and are threatened with spasmodic attacks, or with the consumptive wasting peculiar to such cases, camphor should be administered, and not in too small doses. If, however, its use be too long persisted in, there is danger of emasculating the patient." Schneider speaks of a stout and healthy youth of nineteen, who had been piously and virtuously brought up, but who became suddenly enamored of his stepmother, and whose lust grew so furious that his testicles swelled, and the flow of semen interfered with his urination. He was soon completely cured by the internal and external use of camphor. Alibert relates the case of a woman, twenty-eight years of age, who thoroughly subdued a violent paroxysm of sexual passion by taking a drachm of camphor. On two previous occasions, she had used the medicine with equal success. The following example of the same effect is presented by Eberle. "I was consulted by an elderly married man, of rigidly moral habits. He informed me that he suffered very much from painful erections, and an incessant propensity to venery. He was naturally of a gloomy disposition, which was much increased by his complaint. I ordered him camphor, in two grain

¹ Charleston Med. Jour, xii. 86.

Op. cit., iii. 372.

[•] Therap., p. 349.

² Lancet, April, 1857, p. 422.

⁴ Ibid., Suppl. Bd., 444.

doses, to be taken three times a day. In a week he returned and told me he was almost entirely relieved; and by a further continuance with the remedy he was completely rid of his tormenting complaint." According to Vogt, camphor displays a peculiar efficacy in the erythematous irritation of the genito-urinary organs which cantharides provoke, and which has a strong tendency to run into gangrene. It is perhaps mischievous in pure sthenic inflammation of the same parts; but Latham has reported several cases of its efficacy in relieving retention of urine produced by an exacerbation of chronic disease of the neck of the bladder, and one in which this symptom was produced by cold. He found frictions of the thighs with a camphorated liniment the most efficient method of using the remedy.

On the whole, the cases adduced under this head confirm the conclusion already arrived at by physiological experiment, and show that large doses of camphor are sedative to the morbid as well as to the normal action of the sexual apparatus. One or two cases, it is true, seem to prove that this power may be exerted even by ordinary medicinal doses. They might perhaps be explained in accordance with the general doctrine; but not to appear unduly solicitous to harmonize completely phenomena which are not thoroughly known, the cases referred to may for the present be arranged in that vast class of

medical facts, the exceptional.

Mental Disorders.—According to Murray, camphor has been used in mania and melancholy since the time of Paracelsus. Ettmülller, Sennert, Kinneir, Werlhof, Berger, Rosenstein, and Whytt are quoted among others by the same author as having successfully treated insanity by this medicine. Their cases generally belonged to the maniacal form of the disease, and large doses of the medicine (gr. xx to gr. lx) were administered. In some instances it proved injurious by exciting patients who were previously quiet, or by rendering the maniacal still more violent. Murray puts no faith in the symptoms relied upon by Auenbrugger as indications for the use of camphor, and which are summarily these: A shrivelled state of the genitals, retracted testicles, and comparative coldness of these parts. Other observers have been equally unsuccessful in meeting with these signs. Cullen relates a case of furious mania, in which, after largely employing antiphlogistics, he prescribed camphor, at first in doses of five grains three times a day, but which were subsequently increased. perceptible change was observed until two scruples were taken at each dose, when the patient grew calmer. At last the medicine was given in drachm doses, and the attack was entirely cured. Cullen, however, did not find it equally successful in other instances. Reil holds camphor to be particularly indicated when the countenance is pale, the extremities cold, the breathing sluggish, and the pulse slow; and he directs it to be given in five grain doses four times a day until a scruple is taken at each dose. He thinks, however, that it too often disappoints.3 Berndt has recommended it in large doses for puerperal

^{&#}x27; Med. Communications, ii. 138.

⁸ Richter, op. cit., iii. 376.

² Apparat. Med., iii. 499.

mania, having found it successful after a fruitless employment of antiphlogistics, of ether, and of stimulants. He prescribed it in large
doses. Since the introduction by Pinel of moral influences into the
treatment of insanity, less attention has been given to the purely medicinal remedies which were earlier in vogue, and little can be drawn
from the vast stores of recently published experience to illustrate the
present subject. When used at all amongst the insane by practitioners
of the present day, it has been to palliate nervous agitation, and thus
indirectly to induce sleep.

Camphor has been extensively employed as an anthelmintic. Brera, one of the highest authorities on the subject, says: "I have always used it with the greatest success, and I cannot too strongly recommend its use to physicians in worm complaints." Moscati, indeed, gives it the preference over all other vermifuges. It is thought to be not less efficacious when administered by the rectum than by the mouth, for its effluvium readily pervades the whole intestinal canal. The former

is the preferable mode of prescribing it against ascarides.

In gangrena senilis camphor has some reputation. Sachs relates a case in which the disease was arrested by five grain doses given every two hours, and many other writers offer similar testimony. Several recommend the simultaneous application of finely-powdered camphor to the affected parts. Richter speaks of this medicine as one of the most effectual amongst diffusible stimulants in narcotic poisoning, and a like opinion was entertained by Lassone, Hallé, and Murray. Camphor is also very generally employed to prevent strangury from blisters of cantharides, by mixing it with the ointment of the latter when it is applied, or moistening the surface of the blister with the tincture, and also to subdue this symptom after it has arisen. The production of strangury by blisters is, however, so uncertain that the prophylactic power of camphor, under the circumstances alluded to, may fairly be questioned. But that it greatly relieves this painful symptom, when it is administered internally and in large doses, is proved by abundant and incontestable evidence. It is almost equally certain that it prevents or moderates priapism in gonorrhæa, for those who have had the largest experience in the treatment of venereal affections testify most positively to the fact.

External Uses.—Camphor is employed in almost all external painful affections. Its use in gangrene has already been alluded to. It is not less useful in scorbutic and herpetic sores, and, in fact, all sorts of ulcers that are maintained by a depressed or depraved condition of the system. In such cases the medicine should be applied in substance, and in a very fine powder. When the skin around wounds and abrasions assumes an erysipelatous action, no remedy is more prompt than bathing the part with spirits of camphor. The suggillations caused by surgical apparatus, or by the pressure of the bed when patients are obliged to maintain the same position for a long time, ecchymoses from violence, and almost every variety of painful swelling, including particularly such as are caused by sprains, are everywhere treated by

On Verminous Diseases, trans. by Coffin, p. 199.

camphor dissolved in oil or in alcohol, applied either by friction or by means of compresses saturated with the latter solution. It is not less frequently resorted to as an embrocation in chronic rheumatism and in glandular swellings. Spirits of camphor are very successfully employed to suspend the secretion of milk after parturition, and the oily solution may be applied by friction to disperse the mammary engorgements incident to this period. Camphor dissolved in ether or chloroform, or even in alcohol, and applied on cotton within the cavity of carious teeth, mitigates materially the pain of toethache. used externally to relieve chordee. Twenty or thirty grains are sprinkled upon a poultice, which is applied to the perineum. Snuffing the emanations from a piece of camphor is said to arrest commencing coryza. It is advantageously incorporated in ointments and in other applications made to cutaneous affections when there is painful itching or burning of the affected part. Maury asserts that a camphorated liniment composed of one drachm of camphor to an ounce of oil is a most excellent remedy for the cure of scabies, and Mr. Wilson says: young children and in families, when the odor of sulphur is made a point of serious objection, I have found camphor dissolved in oil answer every purpose of eradicating the disease." Locally applied the same solution, and also powdered camphor, are said to prevent the maturation of variolous pustules.

CONTRAINDICATIONS.—Active congestion and sthenic inflammation, of whatever organ, forbid the use of camphor, but especially when the brain or the stomach is the seat of the morbid condition or process.

ADMINISTRATION, &c.—Camphor may be given in substance, after being pulverized with a little alcohol, but the emulsion is preferable. This is made by rubbing up camphor with loaf-sugar, gum-Arabic, and water; the suspension will be rendered more complete and permanent by the addition of a little myrrh. Camphor-water is too feeble a preparation except for very slight ailments, such as nervous and hysterical excitability; and the tincture, except in small doses, is too stimulating to the circulation. The last-named and various other solutions of camphor in alcohol and oil are used almost exclusively as external applications.

To obtain the stimulant effects of camphor, it must be given in doses of from two to five grains, at intervals of from one to three hours; or, if the prostration and derangement of the nervous system are marked, from ten to fifteen grains may be administered every three, four, or five hours. But the sedative action of this substance, which is so valuable in cases of high nervous excitement, can only be procured by doses of twenty grains and upwards. The last-named quantity will rarely suffice, and the dose must be gradually increased until some decided mitigation or exasperation of the symptoms shows that the object is attained, or is unattainable by this medicine.

¹ RBERLE, loc. cit.

² Diseases of the Skin, p. 247.

ÆTHER.—ETHER.

ÆTHER FORTIOR.—STRONGER ETHER.

DESCRIPTION.—Ether is prepared by distilling alcohol with sulphuric acid. Alcohol is the hydrated oxide of ethyle, and, on the addition to it of sulphuric acid, which has a strong affinity for water, it parts with this element, and an impure oxide of ethyle is obtained. This is purified by redistillation with a solution of potassa for the removal of sulphurous acid, and by agitation with water for the extraction of alcohol. Stronger ether is prepared by agitating washed ether with chloride of calcium and lime, decanting the ether, and distilling half the original quantity. Ether is a clear, colorless liquid, of the sp. gr. 0.750. The sp. gr. of stronger ether is 0.728. It boils below 105° F., and the specific gravity of its vapor is 2.565. It has a strong, penetrating, and at first not unpleasant smell. Its taste is hot, like that of alcohol, but is more acrid. It is very volatile, and by its evaporation will reduce to zero the mercury of a thermometer, the bulb of which is kept moistened by it. It is also very inflammable, and its vapor, mixed with air, is explosive; hence great care should be taken in using it near an artificial light.

HISTORY.—The writings of Raymond Lulli contain perhaps the earliest account of a liquid obtained by the reaction of sulphuric acid with alcohol; but the word ether, which was subsequently used to designate every penetrating vaporizable substance, including highly rectified alcohol, is not mentioned there. Basil Valentine described its mode of preparation and physical qualities, which were further set forth by Valerius Cordus (1544), Boyle, Willis, and others. It seems to have been first called ether (spiritus æthereus) by Froben, a German chemist, in 1730. V. Cordus extolled his oleum vitrioli dulce, given in doses of a few drops on sugar or with water, as a remedy in the plague, and for various spasmodic symptoms, for moderating expectoration in pulmonary complaints, and for alleviating the pain of biliary, renal, and vesical calculi. From the time of Hoffmann it came into general use as a remedy, or at least a palliative, in various spasmodic and painful diseases, and a well-known mixture of ether and alcohol still bears the name of Hoffmann's anodyne. The introduction of ether as an anæsthetic agent will be noticed in a separate article.

ACTION. On Plants and Insects.—Plants exposed to the contact of ether, or its vapor, grow darker in color, and if the exposure be long continued, and in a confined space—as under a bell-glass, for example—they turn brown, and the irritability of their stamens is lost. According to Heyden, insects are rapidly benumbed by ethereal vapor, without changing their appearance. Beetles are immediately killed by it. Butterflies exposed to its emanations, and apparently destroyed by them, will sometimes revive after the lapse of several hours, and seem to regain their original vigor.

On Quadrupeds.—In moderate quantities, ether excites in warm-

blooded animals a lively and fugitive animation, and excitement of the circulation like that produced by alcohol, oppressed breathing, disturbance of the nervous system, and complete insensibility, which passes away without further mischief; but if the dose be increased, the last-named symptom merges into asphyxia, and sooner or later into paralysis and death. On dissection of the animals that have perished from this cause, an ethereal odor can be detected in the abdominal and thoracic cavities.

Orfila introduced about half an ounce of ether into a dog's stomach, and tied the esophagus. In five minutes the animal was seized with vertigo, and soon lost his power of standing. There was no convulsion, and the senses seemed perfect. At the expiration of fifteen minutes the dog became insensible, and his limbs grew flaccid. an hour he had partially recovered, but continued to reel and totter in walking. Soon afterwards he again fell down, and remained insensible for two hours, when he died. The gastric mucous membrane was found, on dissection, of a dark red color, and the other coats were vividly injected. Black and partially coagulated blood filled the heart, and the lungs were gorged with liquid blood. The experiments of Mitscherlich gave analogous results. A drachm of ether was thrown into the stomach of a large rabbit. The animal became almost immediately insensible, breathed laboriously, and could not stand upright. It died, without spasm, in fourteen minutes. muscular contractility of the intestines was found to be feeble. mucous membrane of the stomach and small intestine was very much inflamed. When from four to eight fluidrachms of ether were employed in the experiment, the animal perished in less than five minutes from distension of the abdomen and suffocation.* According to Brodie's experiments, five or six fluidrachms administered to a horse produced a state of lethargy, and completely destroyed irritability.

On Man.—Ether has a peculiar smell and a sweetish taste. It momentarily stimulates the olfactory nerves and the brain. When swallowed, it excites a sense of heat in the stomach, which seems to spread itself from thence over the whole abdomen. Applied to the skin, and allowed to evaporate, it does so very rapidly, and produces a marked degree of cold; but if it is maintained in contact with this surface, it soon occasions heat and redness. The same effects are produced by its application to mucous membranes, but with the addition that it is rapidly absorbed, and produces the phenomena which will

be described under the head of Etherization.

M. Trousseau thus describes the effects upon himself of a drachm and a half of ether taken at a single dose: "There was a singular and sudden attack of suffocation, a feeling of such penetrating and intense cold and heat that the chaos of sensations defied analysis. It was very difficult to swallow the liquid, and as it descended the cesophagus a rather lively heat was felt in this tube and afterwards in the stomach. After the peculiar smell and taste of the fluid ceased to be perceived, the symptoms were like those caused by alcohol, but

¹ Toxicologie, ii. 688.

² Lehrbuch, ii. 348.

more superficial. The senses were indeed suddenly and actively excited, and a trifling vertigo was followed by such an obtuseness of the senses as might be produced by the intervention of a thin veil between their organs and external objects. To these symptoms may be added a slight muddiness of the eye, and an erratic and not unpleasant prickling of the extremities, which ceased in an hour, and was followed by a decided sense of comfort, a wholesome refreshment, and an extra-

ordinary appetite."1

The phenomena described by other observers are essentially such as have been enumerated. Thus, according to Giacomini, when taken internally and in moderate doses, it gives rise to a sense of heat, in the mouth first, and then in the cosophagus and stomach, which is followed by an agreeable coolness in the throat. One seems to breathe more easily, the skin grows warm, red, and moist, the pulse stronger and fuller. The brain is sometimes slightly excited, the distension of the stomach causes oppression, which, however, is soon relieved by eructations. In larger doses, ether produces a species of intoxication with numbress of the limbs, which soon passes off.2 The system readily becomes accustomed to the impression of ether. Lafontaine states that a dropsical patient who had swallowed a bottle of ether, and urinated profusely in consequence, took twenty-six ounces of this liquid in the course of three weeks, and finally got well. Christison mentions a man who for several years took nearly two ounces of it daily. Richter was in the habit of prescribing it in half-ounce doses, and Frank seldom gave less than an ounce a day.

REMEDIAL EMPLOYMENT. Nervous Disorders.—In tetanus, when opium has been carried to the limits of prudence, its action is maintained and heightened by ether. After the battle of Austerlitz it was very successful in arresting tetanic symptoms in the wounded. It is used in every form of syncope and apparent death to stimulate the vital powers, and is especially indicated in purely nervous swooning. It is hardly less so in fainting from loss of blood. Nervous headache, which generally shows itself as hemicrania or in the more limited form of supra-orbital neuralgia (brow ague), is often relieved very promptly by a small dose of ether, particularly when the attack depends upon depressing mental emotions. A flushed face and throbbing temples are not contraindications for its use. These signs of vascular excitement are fallacious, as is proved by the coldness of the hands and feet, which generally accompany them, and sometimes also by the feebleness and infrequency of the pulse at the wrist. Many cases of flatulent colic, spasmodic vomiting, hiccup, and even the paroxysms of spasmodic asthma, are promptly relieved by this medicine. These and other painful affections, including the so-called hepatic and renal colics, are more promptly and certainly assuaged by the inhalation of ether, as will be more fully described in the sequel.

But the most useful of all the applications of ether to the class of diseases under review, is presented by hysteria, in certain of its phases which have been admirably pointed out by M. Trousseau. The more

¹ Op. cit., ii. 244.

superficial these affections are, and the more uncertain, recent, and sudden in their attacks, the stronger is the control of ether over them. Like the greater part of diseases sine materia, hysteria is undefined, irregular, and entirely destitute of that orderly development which distinguishes the phlegmasiæ, for example. Its characteristic is that whether one, or two, or the whole train of its phenomena appear, the disease is essentially present. The accomplished observer divines its presence even from observing that the patient yawns and sobs or sighs without any definite or adequate reason; he detects it in the mere palpitations of the heart, with which the bosom of young girls seems to heave and swell; in a momentary dysphagia, which appears to be caused by a shifting meteorism of the abdomen, a flatulence that suddenly arises and seems to struggle for an escape from the throat; in a spasmodic hiccup, an agitation that seems involuntary and which is accompanied with restlessness and deep sighs; in all of those symptoms which, when united and completely developed, constitute the fit of hysteria. These symptoms, and in proportion as they are recent and uncombined, yield as if by magic to ether. But even a high degree of them does not render ether inopportune. Again, in the male sex there are certain phenomena essentially of the same nature; such, for instance, are flatulence and palpitations of the Some persons, too, of a nervous temperament are liable to sudden and partial congestions, which are often observed to occur as the consequence of hemorrhage. These, which have already been referred to, are usually amenable to the influence of ether. M. Trousseau presents an illustration of the power of ether over the nervous element in a mixed nervous and inflammatory disease. A child with croup had had the operation of tracheotomy performed, and was in an unusual state of agitation with frightful orthopnœa, yet a teaspoonful of syrup of ether from time to time procured rest and sleep for the little sufferer, and not once only, but on several successive occasions until death came to its relief.

An interesting case is reported by Laffont, of puerperal mania occurring in several successive confinements, and in each instance arrested

by enemata of sulphuric ether.'

In Typhous Affections, &c. — Ether has been frequently employed in the several grades and varieties of typhus; and in these forms of disease, there is indeed hardly any contraindication to its use, for it may be resorted to even when the typhous state is complicated with inflammation, with febrile eruptions, foulness of the primæ viæ, or functional nervous disorders. But, as its influence, however salutary, endures but for a brief period, it is rather to be regarded as providing an opportunity for administering remedies of more permanent influence, than as curative in itself. Its ephemeral stimulation is also beneficially invoked on those occasions, which occur so frequently in typhoid affections, when some undue exertion, some excessive evacuation, or some other depressing cause, momentarily threatens to extinguish life. These qualities fit it, in a remarkable manner, to be

¹ Bull de Thérap, liv. 331.

associated with more permanent stimulants, and with tonics; by its means the latter medicines seem to gain stronger hold upon the system, and to exert their peculiar powers with more permanent effect. M. Trousseau' speaks of a somewhat similar employment of ether in cholera asphyxia. He administered it in doses of a dessertspoonful every hour, along with ice and some slightly stimulating drink, infusion of mint, for instance, and suspended its use whenever the pulse began to be felt at the wrist, and some warmth returned to the skin. This moderate degree of stimulation was, according to M. T., the cause of the gentle reaction which took place in his cases, and was sufficient for their cure; they were also untrammelled by the intercurrent inflammations of a bad type which destroyed so many persons in the same disease.

As an Anthelmintic.—Systematic writers generally ascribe anthelmintic powers to ether, and refer particularly to the reports of Bourdier, who succeeded in relieving twelve out of fifteen persons afflicted with tapeworm. But a reference to his cases shows that a very trifling share of the result can be claimed for ether, since it was administered along with one of the most certain destroyers of the parasite in question, viz., male fern. It may, indeed, form a convenient solvent of the active principle of this plant, and in that way, at least, increase its powers. Fifteen or twenty drops of ether in an ounce of water is a very efficient enema for destroying ascarides in the rectum.

not, however, prevent their return.

About the close of the last century, equal parts of ether and oil of turpentine were recommended by Durande, of Dijon, as a specific for biliary calculi. On account of the offensive taste of the compound, Duparcque substituted castor oil for the oil of turpentine, in a mixture which contained fifteen parts of the former to one of ether. Many and eminent physicians have attested the efficacy of both formulæ. Experiments with gall-stones show that these bodies are very slightly soluble in either of the above mixtures; indeed, so far as relates to sulphuric ether, it could act as a solvent only of the fatty portion of the calculus (cholesterin), even were this body plunged in a bath of it. How far such a concretion would dissolve under the influence of the small proportion of ether which might reach it through the circulation, may be imagined. Nevertheless, many cases of biliary calculus have been cured by one or the other of the above preparations of ether, probably more by relieving the pain and spasm which the irritation of gall-stones occasions, than by the solvent operation of the remedy. The latter is, however, maintained to be real by M. Barth.4

Sulphuric ether has sometimes been employed as an antidote to narcotic poisons, and especially the poisonous mushroom. The Italian school of Rasori attached great importance to the powers of ether in cases of poisoning by narcotic and contro-stimulant substances in general, in which class they included digitalis, nux vomica, the salts of

Budd, Dis. of the Liver, p. 297.

4 Abeille M'd., xi. 79.

¹ Op. oit., ii. 249.

^{*} Compare HENOCE, Unterleibskrankheiten, ii. 254; FAUCONNEAU-DUFRESNE, Mal. du Poie, p. 257.

lead, mercury, antimony, and zinc, squill, &c. They alleged, also, that it arrests diarrhoea, caused by an abuse of purgatives of the drastic sort as well as the profuse sweats that are produced by excessive

depletion and by sedative medicines, such as antimony, &c.

External Use.—Ether is very commonly employed, and with great advantage, as an external application either to expel the blood from an inflamed or swollen part, or to mitigate local pain. Some of the most familiar examples of its use are the following: It is applied to the forehead on a very thin compress so as to favor its rapid and complete evaporation, for otherwise the skin becomes irritated by the liquid. This application is very frequently resorted to in attacks of nervous headache, of neuralgia of the frontal nerves, and in diseases attended with delirium, and undue heat of head. A similar application has been recommended in superficial burns. For the two last purposes mentioned it is, however, scarcely comparable to cold water, and its success in the other cases is probably due rather to the anæsthetic properties of the fluid than to the cold produced by its evaporation. In simple neuralgia, particularly of the nerves of the head, its anodyne may be usefully combined with its revulsive effects by applying it on small compresses covered with some solid substance, immediately over the points where the painful nerve emerges from its bony canal, or where it in any other way becomes superficial. These are always the points at which, as shown by M. Valleix, the morbid sensibility of the nerve is most easily detected.

The volatile and refrigerant quality of ether has been successfully employed to favor the reduction of strangulated hernia. As the strangulation depends, not upon the imaginary spasm which is generally invoked to explain it, for spasm in a tendinous structure is impossible, but upon the influx of fluids into the protruded bowel which is then unable to return into the abdomen, it is evident that whatever tends to contract the tissues of the hernial tumor will be favorable to its reduction. Ether does this when dropped upon the tumor and allowed to evaporate. It acts as ice would do, but with less risk of congeal-

ing the protruded bowel.

There is no more certain remedy for toothache when it affects a tooth occupied by a carious cavity, than filling the latter with cotton soaked in ether, or still better in an ethereal solution of camphor. Itard recommended ethereal vapor to be thrown into the auditory canal for the relief of otalgia and of tinnitus aurium,' a practice which was imitated, in 1841, by Mr. Neill, of Liverpool, who, however, administered the vapor by the Eustachian tube,² and by M. Délioux, in 1853, who employed the original method of Itard.³ In some cases of deafness apparently depending upon rheumatism or following catarrhal affections of the auditory canal, instillations of ether appear to have been useful. Mackenzie speaks of ethereal vapors directed against the eyes in amaurosis from irritation or debility, and we may add that we have found them of essential service in morbid sensibility of the retina pro-

¹ Mal. de l'Oreille, ii. 25.

On the Cure of Cataract, &c., 1848, p. 197.

³ Bull. de Thérap., lxiv. 529.

⁴ Dis. of the Eye, 1835, p. 962.

duced by over-exertion of the eye. Inhalation of ether has long been employed as a remedy to recover persons from fainting fits, to palliate hysterical attacks, and subdue nervous agitation. But it was also long ago recommended in more serious ailments. Pinel and Pearson both used it in spasmodic croup, and Currie in asthma. Pearson even asserted its usefulness in consumption, for he found it to diffuse an agreeable coolness throughout the chest, to alleviate oppression and cough, to lessen expectoration and hectic fever, and even, he believed, to promote the cicatrization of tuberculous cavities. It might certainly be used to some extent as a substitute for the opiates it is customary to prescribe in phthisis, and which too often act mischievously by impairing the appetite and digestion.

ADMINISTRATION.—A fluidrachm is the average dose of ether. It may be given upon sugar, or a syrup may be formed by repeatedly agitating the excipient with ether, and removing the excess of the latter. It may also be incorporated in aqueous and other mixtures by being first rubbed with spermaceti, in the proportion of two grains of this substance to a fluidrachm of ether.

Spiritus Ætheris Compositus.—Compound Spirit of Ether; Hoffmann's Anodyne.

This liquid consists of ether, half a pint, alcohol, a pint, and ethereal oil six fluidrachms. The influence of the last named ingredient of the preparation is probably to increase its sedative action on the nervous system. It is less volatile than ether, has a burning, yet agreeable taste, and the odor of ethereal oil. Its sp. gr. is 0.815. In its properties it bears a close resemblance to ether, but is more stimulating to the vascular system, and its action is more prolonged. It is also less apt to embarrass the digestive organs. It may be employed in all of the disorders for which ether has been recommended. In hysterical affections it is perhaps superior to that medicine. Dose, from half a fluidrachm to two fluidrachms.

ETHERIZATION.

History.—The discovery of the anæsthetic¹ properties of ether is certainly one of the most remarkable of the present age. Whether we consider the novelty of its claims, the speed with which its fame spread throughout the civilized world, or the extravagant anticipations that were formed of its powers, it stands without example in the history of medicine. Nor is it less singular that so brilliant and sudden an apparition should have been almost as suddenly eclipsed by a substance still more potent than itself, and to the uses of which it pointed out the way. If the most valuable discoveries in the natural sciences, and above all in medicine, were usually the result of logical inferences from experience, a means of producing insensibility to pain would undoubtedly have been one of the first fruits of man's ingenuity and research. But such discoveries are very differently made. All, or

¹ This term was proposed by Dr. O. W. Holmes, Nov. 21, 1846.

nearly all of them, are the work of chance, or at least of an apparently fortuitous concurrence of circumstances such as human wit could never have alone created. So in the present instance the accidental concurrence of a man of science and a professional artisan, appear to have been the immediate and essential conditions for a discovery on the threshold of which investigators had been standing for more than half a century.

The power of various substances to produce insensibility had long ago been observed, and it is well known that in all ages various narcotic preparations were employed to blunt the sense of pain during the performance of surgical operations. The fumes of some of these were administered by inhalation. The late Dr. Snow, in his historical sketch of anæsthesia, quotes a passage from the work of John Baptista Porta on Natural Magic, in which a certain volatile agent is thus described: "When it is applied to the nostrils of the sleeping person, he draws in the most subtle power of the vapor by smellings, and so blocks up the fortress of the senses that he is plunged into the most profound sleep, and cannot be roused without the greatest effort. After the sleep, no heaviness of the head remains." It is probable, as conjectured by Dr. Silvester, and by Dr. Snow, that this agent was none other than ether.

In 1803, Dr. Benjamin Rush, referring to a case in which a woman gave birth to a child unconsciously during an epileptic fit, remarked: "How far a medicine so powerful (if such can be found) as wholly to suspend the sensibility of the nerves without impairing their irritability, might succeed in destroying pain altogether, I know not." Subsequently he says more explicitly, "I have expressed a hope, in another place, that a medicine would be discovered that should suspend sensibility altogether, and leave irritability, or the powers of motion unimpaired, and thereby destroy labor-pains altogether." In this passage we have a literal anticipation of the effects of ether in parturition.

The first traces of the use of ether inhalations for medicinal purposes seem to be contained in the writings of Dr. Richard Pearson, who, as early as 1795, recommended them for certain pulmonary affections, and especially for phthisis. He prescribed them either alone or combined with hemlock, and directed the vapor to be inspired from an open vessel, or through an inverted funnel, or from a handkerchief wetted with ether and held near the mouth and nose. In Dr. Beddoes' work on "Factitious Airs, 1795-6," there is a letter from a patient of Dr. Thornton, describing the effects of the inhalation of ether employed for pulmonary catarrh. He says that it almost immediately relieved the oppression and pain in the chest. On a second trial he inhaled two teaspoonfuls of ether, which "gave immediate relief as before, and very soon after he fell asleep and had a good night's rest." In still another case, the fumes of burning ether were inhaled to palliate a painful

¹ Chloroform and other Anæsthetics. Lond. 1858, p. 12.

Times and Gaz., Nov. 1857, p. 504. Med. Repository, vi. 30.

⁴ Med. Inq. and Observ., 5th ed., iv. 221.

Med. Facts and Observ., vii. 95.

affection of the breast. In 1815, Nysten stated the inhalation of ether to be useful in certain chronic catarrhs with excessive secretion, for allaying convulsive cough, &c. He describes a bottle like the ordinary respirator, for the purpose of inhaling its vapor. In 1818, an anonymous communication appeared in the Quarterly Journal of Science, to the following effect: "When the vapor of ether, mixed with common air, is inhaled, it produces effects very similar to those occasioned by nitrous oxide." After describing the method of inhaling the vapor by introducing a tube into the upper part of a bottle containing ether, it is said "by the imprudent inspiration of ether a gentleman was thrown into a very lethargic condition, which continued with occasional periods of intermission for more than thirty hours, and a great depression of spirits; for many days the pulse was so much lowered that considerable fears were entertained for his life." In 1831, we find recorded the case of a female who perished by sleeping in a room in which a large jar containing nitric ether had been broken. "She lay on her side, with her arms folded, the countenance and the posture composed, and the whole appearance that of one in a deep sleep." Two other cases, which terminated in recovery, after a prolonged state of lethargy, are referred to in the same journal. In the edition of his Materia Medica published in 1839, Dr. Pereira makes the following statement: "The vapor of ether is inhaled in spasmodic asthma, chronic... catarrh, and dyspnœa, whooping-cough, and to relieve the effects caused by the accidental inhalation of chlorine gas." In a Treatise "On the Practical Use of Inhalations in Diseases of the Throat and Chest, by John Harwood, M. D., &c.," of which a second edition was published in 1839, the inhalation of ether as an antispasmodic medicine in difficulty of breathing is recommended. This physician, who devoted himself to the application of medicines by inhalation, and appears to have used in this manner every narcotic and antispasmodic medicine rather than ether, was upon the very verge of the discovery of "anæsthesia," but missed it by not venturing far enough in the use of ethereal va-"Although, when swallowed," he remarks, "the operation of ether is usually regarded as narcotic and anodyne, yet in inhalation, its sedative or antispas modic influence appears liable to be overwhelmed by its stimulant properties." In March, 1846, M. Ducros addressed a paper to the French Academy of Sciences, in which he showed that sulphuric ether applied to the buccal cavity of the gallinacese produced immediate somnolence with closure of the eyes, erection of the feathers, &c.; and stated that when applied in like manner to the human subject, it was capable of arresting puerperal, hysterical, and epileptiform convulsions.

The power of ethereal vapors to produce exhilarating effects, which closely resemble those of nitric oxide, is familiar to our countrymen, as having been long employed for this purpose in schools and colleges. It is remarkable that the insensibility to pain shown by many of the persons who thus inhaled it, should not have attracted more attention.

Brit. and For. Med.-Chir. Rev., April, 1847, p. 549.

Edinb. Med. and Surg. Jour., xxxv. 452.

VOL. II.—6

For not unfrequently the experimenters became very violent while under the influence of the vapor, and sustained injuries to which they remained nevertheless insensible until after the return of their ordinary condition. The same thing was also observed in the popular exhibitions with nitric oxide.

On September 30, 1846, the first of the new series of experiments which demonstrated the anæsthetic powers of ether, was performed by Dr. Morton, a dentist of the city of Boston, in the manner described below. On the 16th and 17th of October the first public use was made of ether by Drs. Warren and Hayward, in surgical operations at the Massachusetts General Hospital.¹

No sooner were these results known, and the credit of obtaining them awarded to Dr. Morton, than his claims to the distinction were contested by Dr. Charles T. Jackson, an eminent chemist and geologist of Boston. The latter, indeed, maintained that the knowledge of Dr. Morton respecting the anæsthetic properties of sulphuric ether, was wholly derived from himself, and he sustained his claim to a previous acquaintance with its virtues by showing that as early as 1841-2 he had inspired ether to remove the painful effects of an accidental inhalation of chlorine gas. But, as has been seen, this quality of ether was already known, and had been published by Pereira. In Dr. Jackson's history of his own share in the discovery of the anæsthetic properties of this liquid, he states that after the experiment above referred to "he felt prepared to recommend the trial of sulphuric ether vapor for the prevention of pain in surgical operations." But there is nothing to show that he mentioned the anæsthetic properties of ether to any one, until February 1846, when he recommended this liquid to one of his students, as a means of preventing pain in the operation of extracting a tooth. But the ether was not used on this occasion, and does not seem to have been referred to again by Dr. Jackson, until late in September, 1846, when Dr. Morton applied to him for the loan of an India-rubber bag for the purpose, it was alleged, of calming a refractory patient, by causing her to believe that she inhaled from it something to assuage pain. Dr. Jackson discouraged this notion, and then spoke of the properties and the modes of using sulphuric ether, and advised Dr. Morton to employ it instead of attempting to play upon the patient's imagination.

How far these statements were novel to Dr. Morton, must forever remain uncertain. But that they were not altogether so, there is every reason to believe. It is proved by abundant evidence that, during at least two months before the date of this interview, Dr. Morton was in search of an agent to prevent or palliate the pain of dental operations, and that he was led to the inquiry by certain experiments of his former associate Mr. Wells, a dentist of Hartford, Connecticut, who endeavored to make nitrous oxide gas available for the purpose, as Sir H. Davy had originally suggested. After abandoning his attempts

¹ Dr. C. W. Long, of Athens, Ga., claims to have employed ether as an anæsthetic in surgical operations in 1842 (Boston Med. and Surg. Jour., Apr. 1861, p. 229.) It is unfortunate that he should have failed to communicate results, at that time so singular, to the medical profession.

with this gas, it is proved that during a part of the summer and the month of September, 1846, he was experimenting with sulphuric ether. But, from whatever cause, he does not appear to have been successful, until Dr. Jackson pointed out to him the proper mode of inhaling it.

Immediately after his interview with this gentleman, Dr. Morton returned home, and putting into practice the suggestions he had received, is said to have inhaled some ether from a handkerchief, and to have remained insensible for eight minutes. It is certain that on the evening of the same day (September 30, 1846), he administered ether to E. H. Frost. This person testifies, and his testimony is confirmed by two witnesses, that he applied to Dr. Morton while laboring under a most violent toothache, that Dr. M. "took out his pocket handkerchief, saturated it with a preparation of his, from which," says the deponent, "I breathed for about half a minute, and then was lost in sleep. In an instant more I awoke and saw my tooth lying on the floor. I did not experience the slightest pain whatever." Thus the first operation ever rendered painless by ether, was performed by Dr. Morton on the 30th September, 1846.

On the following day Dr. Morton called on Dr. Jackson and informed him of his success, and was advised to get the surgeons of the Massachusetts General Hospital to permit the use of the ether in that institution. Dr. Morton then waited upon Dr. Warren, who promised him an early opportunity of trying an experiment. Accordingly, on the 16th of October, the ether was administered to a man on whom Dr. Warren was about to operate for a tumor of the face, and on the following day, to a female with a fatty tumor of the arm, which was removed by Dr. Hayward. In the first case the effect was not complete, but in the second, "the patient was insensible during the whole time, and was entirely unconscious." On the 7th of November, Dr. Morton administered the ether to a female patient at the Hospital, on whom Dr. Hayward performed the operation of amputation of the thigh; "it was entirely successful in preventing pain, the woman asserting that she had been wholly ignorant of the operation." Other operations were immediately afterwards performed under the same favorable circumstances, by Drs. Townsend, J. M. Warren, Parkman, H. J. Bigelow, and Pierson. Among them were two cases of reduction of dislocation of the humerus.

Is was not long before news of the discovery crossed the Atlantic in letters written by Dr. Bigelow to Dr. Boot, of London, and by Dr. Ware and Dr. Warren to Dr. Forbes. In London, etherization was immediately used by Dr. Boot and Mr. Robinson in operations on the teeth on the 19th of December, and on the 21st of the same month Mr. Liston tried it with perfectly satisfactory results in a case of amputation of the thigh, and in another requiring evulsion of both sides of the great toe-nail.

The Parisian surgeons were not slow in putting to the test the new method of preventing pain. On the 12th of January, 1847, M. Mal-

Lancet, Jan. 2, 1847.

Brit. and For. Med.-Chir. Rev., xlv. 309.

gaigne reported to the Academy of Medicine the results of its use in several operations performed by him, including an amputation of the leg. Although his example was speedily followed by nearly all of the surgeons of France, the practice was at first denounced as hazardous by Magendie, Lallemand, Flourens, Roux, Velpeau, and other distinguished persons. They soon, however, yielded to the rapidly accumulating evidence in favor of the new method. On the 7th of the same month it was used at the Clinical Hospital of Madrid by Dr.

Argumosa.

In Belgium, the anæsthetic was first applied by Bosch, of Brussels, at the same time that Malgaigne was employing it in Paris, and within a few days afterwards (Jan. 27th) Prof. Schuh, of Vienna, operated upon patients subjected to its influence. In Erlangen (by Prof. Heyfelder), in Leipsic, and Munich, it was directly afterwards resorted to, and on the 6th of February by Behrends in Berlin. Dieffenbach, in the last named place, and Chelius in Heidelberg, very soon adopted the new method, but with greater reserve. In a word, the instances of its use multiplied so rapidly that it became impossible to note their peculiarities. The lowest as well as the highest class of physicians and surgeons employed the wonderful liquid, and sometimes with so little circumspection or knowledge of its properties as to cause alarming and even fatal effects. Its administration was on this account forbidden to all persons except physicians in one of the kingdoms of Germany.

While these events were in progress, and from one end of Europe to the other etherization was adopted by almost every surgeon of distinction, the practice made very slow progress in the country of its birth. Several weeks elapsed after the publication of Dr. Bigelow's paper before the subject was noticed by the medical press of the United States, and then it was in tones of doubt and incredulity, and it was not for several months that the practice became at all popular south of Boston. The first operation performed under the influence of ether in the New York Hospital was on February 13th, 1847. This hesitation to accept the new discovery is in some degree attributable to the taint of charlatanism which at first attached to it; to the endeavor to preserve it as a secret; to the title of "Letheon" with which the ether employed in the first operations was decorated; and to the disgraceful attempt of those who introduced it into surgical practice to obtain a patent-right for their discovery. But even after these obstacles were overcome, and this sordid conduct forgotten, there was neither so general a use of this agent, nor afterwards of chloroform, by American surgeons as by those of the old world, and we have consequently less cause than the medical profession of Europe to deplore the fatal results which must be set to the account of the latter at least of these anæsthetics.

ETHERIZATION OF ANIMALS.—Messrs. Cook and Taylor performed upon frogs, guinea-pigs, linnets, and rabbits some experiments, from which they drew the following description of the effects produced by

¹ Trans. Am. Med. Association for 1848.

inhaling ether. "A feeling of discomfort indicated by a distressed look, glassy eye, and attempts to escape, is quickly followed by more rapid and powerful contractions of the heart, by increased rapidity of circulation throughout the whole vascular system, by deeper and laborious or by more frequent acts of inspiration, and an excited condition of the brain. Then the cerebral functions become oppressed, sensation and the power of motion become more and more impaired, the action of the limbs becomes irregular and wild, and the animal, reeling and staggering from side to side, eventually falls down as if lifeless; but respiration still goes on, the capillary circulation is unusually active, and, although the muscular system generally is in a state of relaxation, the involuntary muscles seem preternaturally excited; both the urine and the fæces may be suddenly voided. This stage of complete insensibility is followed, after a time, by symptoms of congestion of the brain; the respiratory act becomes less frequent; the blood, of a dark blue color, stagnates in the capillaries; the extremities feel cold; the lips are blue and livid, and, if the animal be not speedily removed into the open air, respiration first stops, then the contractions of the heart become fainter and fainter; lastly, the peristaltic action of the intestinal tube ceases."

According to Gruby's experiments on various animals, the respiration at first becomes quickened and then labored. If the inhalation is still persisted in, death soon takes place. Relaxation of the muscles is a constant phenomenon. Sensibility is completely extinguished by ether, and death, when it occurs, seems to be caused by congestion of the brain and great viscera, and by paralysis of the respiratory muscles. Depletion restored dogs to consciousness even after they had ceased to breathe.

M. Longet has furnished perhaps the best analysis and interpretation of the phenomena under consideration. Among his conclusions the following are the most important: 1. The inhalation of ether produces complete but temporary insensibility in the cerebro-spinal axis and in the nerves; 2. When a compound nerve is directly etherized it loses its sensibility in all of its trunk and branches beyond the point at which the ether is applied, but may nevertheless retain the function of voluntary motion; this statement is confirmed by Serres; 3. Ether suspends completely but temporarily the reflex function of the spinal cord; 4. For some time after etherized animals have recovered their perception, sensibility is often temporarily augmented; 5. Insensibility always takes place before black blood can be obtained from the arteries; 6. The continued inspiration of ether after insensibility has taken place is almost certainly fatal: but if atmospheric air be mixed in due proportion with the ethereal vapors, the state of insensibility may be very much prolonged without danger to the animals (rabbits) employed; 7. Ether taken into the stomach in quantities sufficient to destroy life does not at any time produce anæsthesia.4

The experiments of M. Flourens' led to substantially the same con-

¹ Lancet, June 19, 1847.

² Carstatt's Jahrbuch, 1847, p. 159.

³ Arch. Gén. de Méd., 4ème sér., xiii. 433.

⁴ lbid., p. 375.

 1bid., p. 434.

clusions. He found that in etherized animals the loss of sensibility precedes that of motility, but both are ultimately suspended; and yet the animal lives, because the automatic or excito-motory acts of respiration and of the heart continue. According to his views of the nervous system, the cerebral lobes, or the seat of intelligence, first lose their power; then the cerebellum, which presides over the equilibrium in locomotion; the medulla spinalis next loses its faculty of sensation and also of motion; and finally the function of the medulla oblongata alone survives. When the last is overcome, death takes place. According to the physiologists now cited, the mode of death in question is not asphyxia, for that is only a negative loss of life, produced by the want of oxygen, but death is to be regarded as resulting positively and directly from the deleterious action of the ethereal vapor itself.

Ether, when taken into the stomach of animals, does not, according to Flourens and others, produce insensibility, but only intoxication. But the Russian surgeon Pirogoff declared that when ether is thrown into the rectum, it gives rise to the very same effects as when it is inhaled. To insure its gradual and complete effect, the liquid should be injected very slowly, or be previously converted into vapor. Dupuy's experiments upon animals show that by this method loss of sensation is as soon produced as by inspiration, and no signs of

asphyxia arise.

Several observers have examined the influence of ethereal respiration upon the condition of the venous blood and of the nervous tissue. In general, the arterial blood grows very dark soon after the commencement of insensibility; but, on the suspension of the etherization, it regains its usual color, and at the same time sensibility is restored. Lassaigne found that the clot of blood drawn soon after etherization is relatively smaller and firmer, and the serum augmented; and also that the blood has an unusually florid color, which it retains for several days. According to other experiments, however, the venous blood of etherized horses continues to be darker than natural during as many as seven days; it at the same time runs more freely, furnishes but little serum, and for the first three days smells strongly of ether. The breath of the animals may emit the same odor during five days. A goat's milk exhaled this smell for five days after the animal had breathed the vapor of ether. The flesh of animals slain during insensibility from ether retains its odor for many days, and indeed it cannot be wholly removed by roasting or boiling. It is an interesting fact that the inspired vapor of ether dissolves the fatty element of the cerebral substance. Bibra, and Harless, in Erlangen, found in the brain and spinal marrow of etherized animals a diminished proportion of fat, while an excess of this substance existed in the liver.

In animals killed during the first stage of etherization the lungs are found very much congested; in the second stage, when the respiratory act is more energetically and actively maintained by the aid of the abdominal muscles, an emphysematous condition of the margins of the lungs is sometimes produced, and sometimes also of the entire

^{&#}x27; CANSTATT'S Jahrb., loc. cit.

⁹ STRUMPF, loc. cit.

structure, to such a degree as to prevent the organs' collapsing when removed from the body.

Action of Ethereal Inhalation on Man.—A glowing or burning sensation is first experienced in the posterior fauces and the larynx, with an increased discharge of saliva, a disposition to cough, oppression and shortness of breath. These unpleasant feelings are of short duration. A general feeling of warmth succeeds; a sense of comfort and exhibitation diffuses itself over the whole body. fingers and toes grow numb, and so, by degrees, does the entire cutaneous surface, in which is previously felt a prickling sensation like that of parts said to be "asleep." The patient is conscious of a momentarily increasing lightness and freedom of motion, all sense of weight vanishes, and the earth seems to reel under the feet. Taste and smell are the first of the special senses abolished, owing to the direct action of the ether upon their organs; hearing grows dull or perverted, and words and other sounds sometimes sound strangely loud, seeming as if echoed in an empty place, and rushing noises fill the The sight in some cases becomes singularly clear, and the outlines of objects appear sharply defined; but sometimes it grows dim, or is mocked with extravagant illusions. Perversions of the senses often attend the commencement of etherization and the period between awaking and the complete return of consciousness. Of this sort is the sense of rapid flight through the air, of unearthly music, gorgeous spectacles, and magical phantasmagoria. The sense of smell is sometimes so far perverted that ammonia, for instance, has a grateful odor. Dizziness and a disposition to repose follow, and the skin may then be pricked or cut without producing much, or indeed any, pain. It is remarkable that although the sensibility to pain is abolished, the sense of touch may remain unimpaired. A patient may be conscious of the contact of external bodies—of surgical instruments, for example—and yet be wholly insensible to pain. Last of all, the remainder of the special senses are dulled or quite suspended, although it is not uncommon for the hearing to remain perfect during the whole process, especially if the patient make an effort to exercise it. But in general there is an absolute and complete insensibility to all external impressions, while the mind is filled with a rapid succession of ideas, which are for the most part of a lively description. Their character seems, however, to be determined very much by the natural disposition or the actual state of the patient's mind, just as the complexion of one's dreams is apt to be a reflection of his habitual cast of thought.

Another series of phenomena is presented to the observer. At the outset the pulse is generally quickened, but varies greatly in its characters; the breathing grows more rapid, the skin warm and moist, the pupils contracted, and the face assumes a livelier expression and color. Not infrequently more or less excitement or restlessness succeeds, and may amount even to delirium, with pugnacity. The particular form of excitement is, however, as various as that from alcohol. Some persons sing, and some lament; some weep, or moan, or sigh; some tremble, choke, or vomit; and many grow restless, and rave

wildly. The latter symptoms are most apt to be presented in persons of an irritable, nervous, or hysterical constitution. The excitement may abate very suddenly—it does so, in most cases, very soon; the disposition to active movements ceases altogether; the limbs grow flaccid, the back bends, the chest sinks down; the speech grows hesitating, the ideas unconnected; the eyelids droop and quiver, the eyeballs are upturned, and the pupils usually dilated; the breathing is slow and deep; the pulse generally infrequent, small, and compressible, but sometimes it is quickened and irregular, and the heart acts in a corresponding manner; the skin is generally cool and moist; the features are sometimes purplish and sometimes pale, and quite dull and expressionless; sense and motion have ceased, muscular contractions can no longer be excited, and the patient lies in a trance-like sleep, which has so strong a likeness to death that few persons can observe it for the first time without alarm.

This state is of short duration (although it seems to the patient to have lasted a long time), and it vanishes almost instantaneously. Even when stupor is produced, it continues for a few moments only after the vapor ceases to be breathed. The patient opens his eyes, is amazed at what has happened to him, and at the short time he is told that he has been asleep; he endeavors to rise, and for some time his ideas are confused, and his sensations are remembered like those of a dream. Very commonly, too, he is excited, and laughs or weeps without motive. His sensibility is apt to be morbidly keen; the pulse becomes fuller and more regular, and the respiration more frequent and natural. Hearing, smell, sight, taste, and feeling return in the order in which they have been named, but their perfect activity is very slowly regained. Indeed, there remains for some time a general sense of lassitude and weariness, as after severe fatigue. The gait is still tottering. there is a tendency to faintness, a general malaise, an unpleasant and enduring smell and taste of ether, and, for several days, all of the secretions exhale the same odor.

In some cases ethereal inhalation occasions its appropriate symptoms within a minute, and in others not for twenty minutes or longer. The duration, also, of these symptoms is unequal, varying from less than a minute to more than an hour. Heyfelder relates a case in which they lasted for several hours, but in general their duration is proportioned to the completeness and length of the process of inhalation. Persons are occasionally met with who seem to be wholly insusceptible to the action of ether, and some who can never be carried beyond the stage of excitement by its means. Some have even the power, by mere force of will, to lessen, if not entirely to prevent, its effects. These peculiarities resemble the more familiar ones of persons who seem incapable of intoxication by alcoholic drinks. Heyfelder arranges the diversities in the phenomena of etherization under the following heads: 1. Complete loss of sensibility and consciousness, which is not unfrequently conjoined with complete collapse. 2. A very marked diminution of sensibility, with an incomplete loss, or, on the other hand, a complete retention of consciousness. 3. Excitement with

imperfect consciousness. 4. Excitement with ordinary consciousness,

or with ordinary or even exaggerated sensibility.

Etherized persons not unfrequently present very different phenomena from those which have been detailed. As already remarked, sensibility is not always destroyed. Some patients, too, show signs of extreme suffering during severe operations, and yet, on the return of consciousness, declare that they experienced no pain, but that they had been dreaming, and they even affirm that their dreams were delightful.' Magendie has drawn attention to the erotic dreams of some females, and most practitioners who have employed ether have met with instances of the same sort." "In some it has been evident, from the movements of the patients, that they were under the influence of the fully-developed venereal orgasm." Other patients awake as from a nightmare, and describe their visions and sensations as having been extremely distressing; that they have suffered violence, been constrained to act against their will, &c. Some not only remember the pain they seemed to suffer, but assert their sufferings to have been greater than if ether had not been employed.

A number of instances which serve to illustrate this subject are related in a paper on the "Psychical Effects of Ether Inhalation," by the late Dr. Moreton Stillé, whose general conclusions may be appriately quoted in this place as a summary of many things in the preceding pages.

"1. That the consciousness or perception of external objects and impressions is impaired in the early and lost in the final stage of

etherization.

"2. That during the time the mind remains susceptible to external impressions at all, these reach it in a feeble or perverted manner.

"3. That the emotions, and especially those of an erotic character,

are excited by the inhalation of ether.

- "4. That voluntary muscular movement is not paralyzed until the state of perfect narcotism is produced, at which time, however, all outward consciousness is extinct.
- "5. That the memory of what has passed during the state of etherization is either of events wholly unreal, or of real occurrences perverted from their actual nature.
- "6. That there is reason to believe that the impressions left by the dreams occasioned by ether may remain permanently fixed in the memory with all the vividness of real events."

Dr. Henry Hartshorne, from another point of view—from a physiological analysis, that is, of the order of phenomena produced by anæsthetics—concludes that "artificial acinesia, or loss of motor power, never occurs unless anæsthesia has preceded or accompanies it."

In general, the after-effects of etherization are inconsiderable. Sometimes a pleasant exhibitantion continues for several hours. On other occasions more or less distressing, and even alarming, symptoms

BRIERRE DE BOISMONT, Revue Méd., cii. 218.

² Compare Dr. Tyler Smith, Lancet, Mar. 27, 1847.

Phila. Med. Exam., Dec. 1854, p. 730.Trans. Phila. Coll. of Phys., Dec. 1854.

present themselves. There is congestion of the brain or lungs, inexpressible anxiety, a frequent and thready pulse, stertorous breathing, convulsive restlessness or cataleptic rigidity with prolonged insensibility, and a variety of hysterical phenomena which are almost exclusively observed in female patients. Writers also enumerate among the consequences of etherization a temporary loss of memory, prolonged deafness, uncommon muscular weariness or exhaustion, dysury, various spasmodic phenomena and even tetanus and permanent epilepsy, unusual pain in parts operated upon, secondary hemorrhage, slowness and irregularity of the reparative process, gangrene, phlebitis, and suppurative fever; and finally death, preceded by coma, convulsions, delirium, and general relaxation.' Much discussion has arisen as to how far these and similar phenomena have been owing to the use of ether. Many attribute them to an improper manner of employing the vapor, many to its bad quality, and many more to the peculiarities of the patient or of his disease. The last opinion is, we believe, in most cases the correct one.

At the commencement of the practice of etherization its dangers were stoutly denied by many of the most influential persons and organs of opinion. A writer in an English periodical says: have been unable to discover, after the most extended inquiries, a single case in which the process certainly produced death, or left behind it serious consequences that were certainly attributable to it." Heyfelder, whose treatise was published about the same time, had not met with any fatal result or permanently injurious consequences; and Dr. Snow's not less extensive experience during the same year, furnished him with no serious accident. "Except a headache," he remarks, "on one or two occasions, the only unpleasant effect that I have ever seen from the inhalation of ether, has been sickness and vomiting, which are only occasional results." But a belief in the innocuousness of the process was not of long continuance. During the same year, 1847, M. Lach, in his work on ether, published nine cases in which this fluid was the immediate cause of death; and about the same time the editor of the Monthly Journal of Medical Sciences says "fatal effects have become multiplied," and he mentions five or six other cases in which death was more or less dependent upon ether. In one of these, ether was declared by a coroner's jury to be the cause of death, and the surgeon himself concurred in the correctness of this verdict. Dr. P. F. Eve also reported two cases, in one of which ether was the sole, and in the other the immediate, cause of death.

Velpeau and others have attributed most of these instances of mischievous effects to the improper manner in which the ethereal vapor was administered, and it cannot be denied that the criticism is, to

¹ See a paper by J. Henry Clark, M. D., and one by Frederick D. Lente, M. D., in the New York Jour. of Med., 3d ser., i. 181, 354.

Br. and For. Med. Rev., April, 1847.

Die Versuche, &c., p. 75.

On the Inhalation of the Vapor of Ether in Surgical Operations, 1847, p. 43.

De l'Ether Sulphurique, et de son Action Physiologique, &c., p. 211.

April, 1847, p. 799. For other cases, see Braithwaite's Retros. (Am. ed.), No. xv. p. 344.

⁷ South. Med. and Surg. Jour, June, 1849.

some extent, a just one. A portion of them also may justly be set to the account of the operation itself, which the several patients underwent, and to that shock to the constitution which is well known to be a source of fatal issues after operations performed, not only without the use of an anæsthetic agent, but in the absence of any influence whatever of a deleterious nature. Dr. Snow admits but two deaths which have been recorded as occurring during the administration of ether, and he adds, "It is not probable that the death in either case was due to the ether," but in the one, from the want of admission of sufficient air to the lungs, and in the other from hemorrhage. In 1855, Dr. Hayward, of Boston, referring to one of the same cases, and reviewing the whole question, declared that "there is reason to doubt whether death has in a single instance been produced by it, when it has been properly administered." MM. Perrin and Lallemand, in a synoptical table of sudden deaths in the anæsthetic state, enumerate only three as being due to the inhalation of ether; and a committee of the Boston Society for Medical Improvement declared, in 1861, that "There is no recorded case of death, known to the committee, attributed to sulphuric ether, which cannot be explained on some other ground equally plausible, or in which, if it were possible to repeat the experiment, insensibility could not have been produced, and death avoided. This cannot be said of chloroform." If it were still objected, as it was on the first introduction of anæsthesia, that there are examples enough of death caused by this agent to prove its hurtfulness and to call for its banishment, it might be replied that the number of such cases is altogether inconsiderable when compared with the almost innumerable instances in which ether has been administered by inhalation, not only without accident, but with manifest advantage to those who inhaled it. But, still further, it may now be positively asserted, that since the proper mode of its administration has been understood, that is, since care has been taken to admit a sufficient proportion of atmospheric air along with the ether into the patient's lungs, there is not one authenticated example of its having destroyed life. There is no active medicine but has occasionally had its victims, of whom some perished through its mal-administration, and some through their peculiar susceptibility to its influence, yet no one thinks of banishing them from practice for such a cause. Not less unwise would it be to neglect the advantages of etherization on account of its rare, and, it must be added, questionable mishaps.

It at one time was said that the blood of etherized persons is, with few exceptions, more liquid and darker than natural, and has a small and loose clot; that it flows but sluggishly from the veins; that it smells strongly of ether, and contains a few crimped corpuscles, which were said to assume polypoid forms; that it also separates slowly and incompletely into a large, dark-colored clot, and a large proportion of dirty-brownish serum, exhaling a strong smell of ether; and that the venous blood does not undergo its appropriate changes in the capillary

⁴ Bost. Med. and Surg. Jour., Oct. 1861.

¹ Chloroform and other Ansisthetics, 1858. ² Surgical Reports, &c., p. 243.

³ Traité d'Anzesthésie Chirurgicale, p. 342 (1863).

vessels. These statements, made in the infancy of etherization, have not been confirmed by recent observers. The blood may contain a larger number of fat corpuscles than under other circumstances.

The bodies of those who die after having inhaled ether continue for several days to emit a strong smell of this fluid from every cavity. The veins, of the central organs especially, are distended with dark and liquid blood. A thin and clear serum is found in the cavity of the arachnoid. The heart is flaccid and empty, or its right cavities are distended with black blood. The upper portion of the lungs is cedematous, and the lower engorged with dark blood. The lining membrane of the mouth, pharynx, and air passages is, for the most part, congested, and covered with mucus; the liver and kidneys are congested, the gall-bladder is distended with dark and liquid bile; and the bladder is filled with urine which smells strongly of ether.

In Surgical Operations.—The general effects of ether having been sufficiently set forth in the preceding pages, it is needless to describe anew the phenomena observed during surgical operations performed on persons under its influence. It may be proper, however, to consider, in this place, the precise nature of its usefulness in surgery, and the limits to its employment which have been established by experience. Undoubtedly the pre-eminent value of etherization consists in its power of mitigating, and very often of completely annulling, the sense of pain. A subordinate value is that it removes the injurious influence of pain upon the ultimate issue of surgical operations. Were it true that the former of these qualities is the only one possessed by ether, it would still form one of the most precious resources of medi-For pain is the one great evil of man's physical condition. The aim of his whole life is to shun it, and enjoy comfort in its stead. It is the grand hindrance to his exertions which it paralyzes, and to his progress which it retards. It is the perpetual disturber of his well-being. It forces him to desist from seeking what he desires, and mars the enjoyment of what he already possesses. When he is overtaken by disease, or receives some injury that calls for surgical interference, the dread of pain leads him to put off an appeal to the proper remedy, until, perhaps, the chances of its success are reduced almost to nothing. And when, at last, he submits to the dreaded operation, his apprehension of its result depresses his vital power, and diminishes, if it does not entirely neutralize, the good he looked forward to enjoying. But anæsthesia strips the needful remedy of its terror, induces the patient to accept it while it may still be safely and successfully employed, and at the same time lessons the risk which, under the most favorable conditions of another sort, could not have been avoided.

Prof. Miller, of Edinburgh, enumerates the following among the advantages of anæsthesia in surgery, and, although his remarks refer especially to chloroform, they are equally applicable to ether. 1. Anæsthesia permits the performance of operations otherwise inexpedient or impracticable; 2. It affords great relief to the operator as well as the patient; 3. It does not favor hemorrhage, but the reverse; 4. It not only annihilates pain during an operation, but probably dimi-

nishes it afterwards; 5. It is of much service in cases of dislocation, in the examination of injuries, the treatment of irritable stricture, in sounding for stone, in the taxis for hernia, and in saving the feelings of delicacy and modesty in women.'

It can no longer be doubted that anæsthesia does really diminish the chances of failure of surgical operations. Nearly all competent authorities agree that it does so. The fact has indeed been fully demonstrated by the statistical researches of Dr. Snow, Dr. Simpson, and others. Dr. Snow published the returns relating to this subject of three of the principal hospitals of London, which abundantly confirm the presumption that the want of apprehension and the freedom from pain of the patients tended in a decided manner to diminish mortality and promote recovery after surgical operations. But Dr. Simpson has furnished numerical data which leave no room for doubt upon the subject. Having first obtained authentic returns of the mortality after amputation of the thigh, leg, and arm in the principal British and Parisian hospitals, he finds upon comparing them together that, while 29 in 100 died under these amputations performed upon patients who were not etherized, only 23 in 100 of those operated upon in the anæsthetic state perished. Later statistics by this author give a still more flattering impression of the advantages of anæsthesia. He found that, while in amputations of the thigh without ether the mortality is 44 in 100, the same operation is attended with a mortality of only 24 in 100 where ether is employed. It is unnecessary to carry these comparisons further. The entire experience of surgeons with etherization leads to the same result, and irrefutably demonstrates its value.

Almost every operation known to surgery has been repeatedly performed upon persons under the influence of ether. Experience has, however, shown to which among them it is most applicable, and to which it is unsuited. Those of the latter class are found to be much more numerous than was at first suspected. The contraindications to the use of ether are included in the following summary.

As has been intimated, the period of infancy and that of old age augment the risk to which etherization exposes the patient. And this is undoubtedly true in spite of the instances to the contrary which may be met with in medical annals. Several examples, indeed, there are of operations upon children within the year, and upon old men past four score, which have been completely successful; but these examples ought not to have the force of a rule, for the caution of surgeons has restrained them from a general employment of the method at the two extremes of life. Mr. Syme warns against administering ether to persons in a state of great weakness or exhaustion, and the counsel may be extended to apply to the weakness of infancy and the exhaustion of old age.

Almost all competent authorities unite in dissuading from the use of etherization when the patient is affected with diseases of the respiratory apparatus or affections of the brain, and when there is a

Surgical Experience of Chloroform, p. 26 et seq.

tendency to hemorrhage. It is equally improper for operations in which the sensations of the patient furnish a guide to the surgeon's acts. Such is lithotrity. Operations upon the palate, uvula, tonsils, and trachea, for strangulated hernia, paracentesis for empyema, &c., are more safely and satisfactorily performed during the patient's consciousness, for in the first mentioned of these the blood may flow into his trachea and cause suffocation, and in the last two his sensations should limit the continuance of the operation.

In certain cases also the voluntary muscular action of the patient is an important means of success; such are resection of the maxillæ, the removal of deep-seated tumors of the neck, excision of the cervix uteri and of internal hemorrhoids, and also tenotomy. Anæsthesia is contraindicated in operations in which it is important that the patient remain perfectly quiet, as in tying aneurismal arteries, all cases of ophthalmic surgery, operations for hare-lip, for strangulated hernia, for vesico-vaginal fistula, &c.; and, finally, in very brief operations, such as the extraction of teeth, the opening of abscesses, &c., the use of ether is hardly warrantable except in cases of great timidity on the patient's part.

These limitations to the extravagant predictions of the early advocates of etherization may be extended by the remark which Velpeau was one of the first to make, viz., that this condition is not by any means so favorable to the action of the surgeon as is popularly imagined. This eminent surgeon denies that an operator can feel himself as much at ease with a patient under the influence of ether as with one who retains his sensibility. For, as he knows that the process involves some danger, he is apt to be in haste to finish his work, and this thought almost necessarily distracts him; and, as already intimated, the patient is unable to aid him by a change of position and by performing a variety of acts which greatly facilitate the several steps of the operation under ordinary circumstances.

In Midwifery.—Sulphuric ether was first used to relieve the pains of childbirth on the 19th of January, 1847, by Prof. Simpson, of Edinburgh.² The subject of the trial was a woman of extremely narrow pelvis. In a previous labor the fœtus had to be removed piecemeal, but on this occasion the child was, after version, born alive. It soon perished, however, but the mother, who remained unconscious during the whole process, recovered rapidly from its effects. The first case of anæsthetic midwifery in France took place on Jan. 30, 1847, under the care of M. Fournier-Deschamps, and on the 23d of the following month M. Dubois communicated to the Academy of Medicine his experience in the same field. Shortly afterwards, Siebold, of Göttingen, employed ether during labor. But so little progress had the use of this agent made in the United States that the first case of delivery under its use occurred in the practice of Dr. Keep, of Boston, on the 27th of April, in the year above mentioned.

Strange though it may now appear, the use of ether was at first strongly reprobated, both in England and in this country, upon the

Bull. de Thérap., xxxviii. 334.

Month. Jour. of Med. Sci., vii. 639.

those in which these same things have happened without ether." And he subsequently declares, even more emphatically, that, "so far from uterine contractions being diminished or suspended by ether, it is notorious that they are often increased in force and efficacy by inhalation." All observers are further agreed that the abdominal muscles contract readily during etherization, and that it does not, unless excessive, hinder the contraction of the womb after delivery.

Etherization preserves the mother from the shock and exhaustion of the throes of labor, especially during its last stage; and this doubt-less accounts for the more rapid recovery which follows instrumental as well as natural labor performed under this influence, than when

ether has not been employed.

There is no evidence that etherization is injurious to the child. Dr. Simpson has indeed known the heart of the fœtus to beat somewhat more rapidly when the mother has been kept long and fully etherized, but no evil consequences have ensued. Finally, it is pretty generally agreed that the soft parts of the mother are very sensibly relaxed during the process; the resistance of the perineum is lessened, and the passages are more freely lubricated by their proper secretion. Indeed no means of overcoming rigidity of the os uteri are so certain or so prompt as etherization.

It may be added that ether has been used successfully to combat after pains, and that, according to some authorities, the secretion of milk is promoted by the fact of the patient having been delivered

under the influence of this agent.

The following propositions laid down by Dr. Cotting, of Roxbury, Mass., appear to be a just summary of this important subject, and as such we commend it to the reader.

I. That in ordinary cases of midwifery, while ether may be allowed in moderation when importunately demanded by the patient, it is quite as well, in the long run, to say the least, to let normal, uncomplicated labors proceed uninterfered with.

II. That in painful, laborious, or complicated labors, and in cases of great tenderness or great rigidity of the organs, of extraordinary susceptibility to pain, and where there is great nervous irritability, or undue apprehension of danger, ether, if favorably received, should be used to the extent of overcoming the abnormal condition and suffering.

III. That in cases requiring mahual or instrumental interference, ether should be used to the same extent and upon the same general principles as in other operations involving pain and danger to the patient.

IV. That in puerperal convulsions, especially in those having the character of uræmic eclampsia, ether should be given as soon as there are indications of an approaching fit, and be continued, if seemingly efficacious, until the paroxysm has subsided, and quiet sleep is induced, or until other medicine, if desirable, can be swallowed, care being taken to allow a sufficiently large quantity of pure air, and not to continue the ether if coma supervene.

¹ Bost. Med. and Surg. Journ., Dec. 1858, p. 372.

V. That as all volatile anæsthetics yet tried, except ether, have been known to cause severe accidents, and even instant death, though given with the greatest care by experienced practitioners, and this, too, before any considerable quantity had been inhaled, ether only should be used as an anæsthetic in midwifers.

should be used as an anæsthetic in midwifery.

It is very remarkable that while a certain number of deaths after surgical operations have been set to the account of etherization, there does not seem to be a single instance on record of this result attending etherization in childbirth. This striking fact may perhaps be attributed to the less favorable condition of general health in which patients under the hands of the surgeon are generally found, in consequence of previous exhausting disease, or the shock of an injury recently sustained, or else the shock of the operation.

Various Diseases.—On comparing the several reports that have been published concerning the employment of ether in disease, it is evident that two classes of affections have been almost exclusively benefited by it. These are painful and convulsive affections, in which the symptoms arise from a derangement of one or the other of the two

great functions of the nervous system, sensibility and motility.

Neuralgia. Numerous cases are recorded which show that the inhalation of ether is one of the most prompt and efficient palliatives of this painful malady, and that occasionally it seems to contribute to a permanent cure. Relief is obtained by a degree of etherization short of insensibility, and which may be prolonged, if necessary, for several hours. The inhalation of ether, in conjunction with the local application of chloroform, or even of ether itself, is now, it may be presumed, almost universal in the treatment of this affection.

Tetanus. Reichert was, perhaps, the first to record a case of idiopathic tetanus in which inhalations of ether produced a speedy and perfect cure. Other examples of traumatic tetanus cured by this remedy, are reported by Mr. Hawkesworth, by Mr. Hopgood, by Mr. G. H. Smith, and Dr. Theobald, of Baltimore. In the last example, the control of ethereal vapor over very severe tetanic convulsions, was fully illustrated by the progress of the patient's improvement, which was irregular and interrupted in the same degree as the administration of the remedy. In all of these cases the effect of the ether was immediate and decided. Indeed, in several of them it evidently saved the patient's life in spite of the incongruous and somewhat harsh treatment employed at the same time.

Hysteria. Nothing so distinctly moderates the paroxysms of this disease as the inhalation of ether. Some observers have indeed found the spasms to be aggravated by a certain degree of etherization, but there is no doubt that in these instances too small a quantity of the vapor was employed. A persistence in using it would undoubtedly have put an end to the fit. It is no argument against this use of ether that it sometimes excites in healthy persons spasms of an hysterical

¹ CAMPTATT, op. cit., 1847, p. 164.

RANKING'S Abstract (Am. ed.), v. 341.
Lancet, Dec. 1849.

Ibid., vii. 36.
 Am. Jour. of Med. Sci., N. S., xv. 96.

VOL. II.—7

type. The fact that, when duly administered, it arrests such spasms is the only proper ground on which to base its remedial application in the present case.

Puerperal Convulsions. Dr. Cabot was the first to publish a case of its successful use in this affection, but it does not appear to have been frequently employed. The general success which attends venesection in puerperal convulsions, proves them to depend upon something more than the simple element of perverted innervation, and to require, therefore, a compound treatment. Perhaps after depletion ether would become more appropriate. It was thus used in a case reported by Dr. Griscom, of Philadelphia. The patient was plethoric and anasarcous. Two pints of blood were taken by cups and leeches from the head, and inhalations of ether commenced. After its exhibition the convulsions became less frequent and violent, and at the end of seventeen hours, a living child was born. A similar instance occurred. in the practice of Dr. N. J. Knight, and, under like circumstances, etherization is recommended by Dr. Cotting. This practice has been successfully pursued by Dr. Storer, Dr. Channing, and other physicians of Boston. Abroad, it would not appear that ether has been employed in puerperal convulsions, although many cases of the successful treatment of such convulsions by chloroform have been pub-It is evident that either of these anæsthetics may prove advantageous in proportion as the convulsive attack partakes more of the irritative or hysterical and less of the congestive or apoplectic form.

Infantile Convulsions. In proportion as the attack is simple, i. e., independent of material organic causes, and produced by a morbid susceptibility of the nervous system, will ether control the convulsive phenomena. Their recurrence is to be prevented by agents appropriate to the special cause of the attack, and applied, according to circumstances, to the gums, the stomach, the bowels, &c.

Whooping Cough; Spasmodic Asthma. Dr. R. Willis states that he used ether by inhalation in these diseases for several years before the discovery of its anæsthetic properties. In asthma, he remarks, ether had long been familiarly employed, given by the mouth, but "I have for many years been aware of the fact that it is vastly more efficacious administered directly in vapor by the breath. A single short and difficult inspiration is hardly made before the effect is experienced; and I have occasionally seen the paroxysm ended in six or eight minutes, the respiration having in that brief interval become almost natural. It is not otherwise with whooping-cough; the paroxysms of coughing are positively cut short by using the ether when the fit is perceived to be coming on. So effectual have I seen its immediate application, that I have found it necessary to suffer the patient to have an occasional fit of coughing to its natural termination, with a view of clearing the chest from accumulated mucus." Some cases of nervous aphonia have been cured by the inhalation of ether.

^{&#}x27; Dr. Channing, op. cit. 2 Trans. of Coll. of Physicians, March, 1856.

³ Boston Med. and Surg. Jour., Feb. 1857, p. 33.

⁴ Braithwaite's Retrospect (Am. ed.), 1847; xv. 103.

Delirium Tremens. Dr. Upham, of Boston, has related a violent case of this affection, which was arrested in full career by the inspiration of ether. In that form of it distinguished by great restlessness rather than violence, with a weak pulse, and cool extremities, the remedy

might possibly be dangerous.

Mania. Ether has been repeatedly employed in this disease with the effect usually of palliating the paroxysms, and in some recent cases it seemed to contribute to the cure. It has also proved useful in some of those distressing instances of active mania in which the patient continues to move incessantly without a moment's sleep for weeks at a time, by procuring sleep, and thereby abridging the period of excitement. In certain cases of puerperal mania, it has apparently cut short the disease at once.

Cerebro-spinal Meningitis. This terrible malady, which has also been known, in the United States, as spotted fever, and of which delirium and tetanic symptoms are the most prominent characteristics, has been very beneficially modified by ether. It seems to have moderated the more violent symptoms, to have contributed materially to its cure, and, as shown by fatal cases occurring after its use, to have diminished the tendency of the disease to produce plastic exudation

within the cerebro-spinal cavity.1

Dysmenorrhea, &c. This affection, in which violent uterine spasms and excruciating pain are conjoined, presents one of the fittest occasions for employing ether. It unquestionably shortens the paroxysms while it moderates or completely annihilates their pain, and at the same time spares the patient that profound exhaustion which follows each attack, and, by its frequent renewal, undermines the general health. It is equally applicable to the relief of after-pains. The pain caused by the passage of biliary and urinary calculi through the excretory ducts of the liver and kidneys, has an analogous origin to that just described, and is even more severe. Yet it is completely under the control of ether, which keeps the patient in a state of comparative comfort, until the escape of the calculus relieves him entirely. If, moreover, the excretory ducts referred to are really capable of being thrown into spasm by the irritation within them, the ether, by relaxing this spasm, must render the passage of the calculus through them more rapid than it otherwise would be.

Some feigned diseases, those, at least, in which the body or limbs appear to be rigidly bent or distorted, are readily discovered by etherizing the patient, and suspending for the time his volition. The fraud

then becomes immediately apparent.

ADMINISTRATION.—The ether to be used in inhalation must be perfectly pure—that is to say, free from any of the acid used in its preparation, as well as from uncombined alcohol. For this end it should be washed thoroughly with water, allowed to stand for a short time, then carefully decanted, and dried with chloride of calcium.

Etherization should never be employed after a full meal; for either vomiting will be induced, or else an unpleasant degree of fulness about

¹ CANSTATT, op. cit., 1847, p. 165.

the head and stomach will remain after the operation. The position of the patient, while inhaling, should be that which will be most convenient for the subsequent action of the surgeon or accoucheur. All needful preparations should be made beforehand, so that the operation may be commenced immediately on the supervention of insensibility.

It is very important for success that the patient's attention be not diverted by any questions, or remarks made in his hearing. He should be particularly instructed in what manner to regulate his breathing, and be made to empty his lungs of air as far as possible before the

first inspiration, which ought to be prolonged and full.

When etherization was first employed, an almost endless variety of apparatus was devised for the purpose of regulating the supply of vapor administered. But these were nearly all found to be cumbrous and inconvenient; and, as early as March, 1847, Dr. Smith, of Cheltenham, introduced the practice of using only a piece of sponge large enough to cover the mouth and nostrils. Prof. Syme, after experiencing much annoyance from different forms of inhaling apparatus, finally adopted the plan of placing the ether on a piece of sponge contained in a flask which was furnished with a mouth-piece and an aperture at the side to admit the air. With this apparatus, "the patients, instead of requiring a tedious and laborious respiration, frequently interrupted by cough, yielded almost immediately to the overwhelming and not unpleasing influence of the full ethereal stream." Dr. Simpson found that for surgical purposes, and when it is not necessary to keep up the etherization above five or ten minutes, the sponge is by far the best instrument. Dr. Morton also abandoned the · use of any inhaler, and adopted the sponge after the manner described by Dr. Smith. This gentleman directs that, before being used, it should be well washed in lukewarm water, and then from half an ounce to an ounce of ether, or whatever quantity is necessary to saturate the interior of the sponge, should be poured upon it. This is the method preferred by Dr. Hayward, and the only one, so far as we know, employed in this country. According to Dr. Snow, the quantity of ether required to produce complete insensibility is usually from six fluidrachms to one ounce in the adult, and in children in the same proportion, according to their age. The quantity required to keep up insensibility during an operation is seldom greater than that which induced the state of etherization; but this statement has reference to the use of inhaling instruments, in which there is less waste than with the sponge. But by both methods the quantity consumed is far greater than when the patient respires from a closed cavity, as recommended by Porta.

Supposing a sponge to be employed, it is, when prepared as above directed, to be brought near enough to the patient's mouth and nostrils to prevent any air from entering either of these openings without being charged with a portion of ethereal vapor. If the patient coughs and strangles, the sponge may be brought up gradually to the face. But although this palliates the difficulty, it very needlessly prolongs the process. Dr. Channing states that in some persons there is so much dyspnæa and cough as to contraindicate the further use of the ether;

or else they experience disagreeable sensations in the head, more or less severe distress, noises, flashes of light, tingling of the limbs and trunk, nausea, vomiting, &c. But all surgeons who have given due attention to the subject agree that the symptoms just mentioned, as well as those of excitement, are owing to a too gradual and imperfect inhalation of the ether. It is therefore desirable, for the patient's as well as the surgeon's sake, that the full effect of the ether should be obtained as rapidly as possible when an operation is to be performed. And hence it is found best to renew the supply of ether by introducing it through the sponge, which should not be removed from the patient's face. In natural labor the case is somewhat different. Here it is unnecessary to produce complete insensibility and unconsciousness. is enough to diminish suffering, and this object can be gained without the risk of bringing on the unpleasant symptoms described above. If the patient is intelligent, she can regulate the degree of insensibility produced, by the severity of her pains, and call for, or herself employ, the ether when she feels that a pain is about to commence. In general, it is unnecessary to administer the ether until the presenting portion of the child begins to distend the external parts. Cases of rigidity of the os uteri are exceptions to this rule.

It is not always easy to infer the existence of insensibility from the patient's appearance. But if the eyelids do not contract when the eyelashes are touched, if the breathing is decidedly automatic and somewhat stertorous, and the expression of the face indicates unconsciousness, the patient is in a fit state to be operated upon. Occasionally, before this stage, a spasmodic contraction of the respiratory muscles takes place, which threatens to produce asphyxia; the patient's face grows purplish, and he ceases to breathe. Under these circumstances it is advisable to suspend the inhalation until the breathing is resumed. The state of unconsciousness, which may be regarded as the normal effect of etherization, must be prolonged by meeting every indication of returning sensibility with a renewed administration of ether, which need not usually be continued longer than a minute at a There is very seldom, according to Dr. Snow, any struggle as the patient returns from complete to partial unconsciousness; but if there should be, the ether must be given anew, and the patient kept motionless. In all cases, however, of surgical or obstetrical operation the care of the person who has charge of administering the ether should be given to maintaining the patient as little as possible beyond the point of complete insensibility. To do less than this, embarrasses the surgeon; to do more, may endanger the patient.

The method of Pirogoff, which consists of injecting the vapor of ether, and ether itself, largely diluted with water, into the bowel, has been condemned by some who have used it, on the ground of its occasioning extreme flatulent distension of the abdomen. But many of those who have employed it to relieve painful internal maladies, such as neuralgia, spasm of the muscles of deglutition, lead colic, inflammatory pains of the joints, and cancer of the intestinal tube, report favorably of its anodyne and antispasmodic effects.¹

Although we believe that the profession, in this country at least, is agreed to dispense with inhalers for the administration of anæsthetics, the reader may be interested in knowing the opinion and precepts of so competent an authority upon this subject as the late Dr. Snow.

He objected to inhalers of glass and sponge because they are indifferent conductors of caloric, and hence the evaporation of the ether is very much checked. He preferred the inhaler proposed by Mr. Jeffries for the inhalation of watery vapor, and which consists of a plated copper box, to the lower surface of the lid of which is soldered a spiral volute which reaches nearly to the bottom of the box. There are two openings in the lid, the one communicating with the central, and the other, which is furnished with a tube, with the peripheral portion of the spiral cavity. If, now, ether be introduced into the box, and air be drawn from the tube, it is obtained highly charged with ethereal vapor, particularly if the box be prevented from getting cold, by being immersed in water of the temperature of the air—say at 50° or 60° F.

Dr. Snow advises the use of a face-piece connected with the inhaling-tube. This is a box made of sheet-lead, extending from the bridge of the nose to the fossa of the chin, and to either cheek, and fitting closely to these parts. Its lower part is connected with the inhaler by means of a wide flexible tube, which, at its entrance into the mouth-piece, is protected by a valve opening towards its cavity. Its front surface also presents an aperture covered with a valve, which opens outward, and can also be turned aside. By this arrangement the atmospheric air can be mixed, in any required proportion, with the ethereal vapor, and the whole of the expired air escapes, instead of being forced back into the receptacle of ether.

At the commencement of inhalation the outer valve is left entirely open, so as to admit the vapor of ether by degrees, and avoid the irritation which would otherwise arise. About thirty per cent. of vapor of ether in the inspired air is necessary, according to Dr. Snow, to produce insensibility in a convenient time; but this proportion must be gradually reached. The quantity of ether required to produce this effect in the adult is about a fluidounce when an apparatus like the above is used, but much more when the sponge or handkerchief

is employed.

The subject of etherization may be concluded with an account of the method employed by Prof. Porta, of Pavia. According to the statements of those who have employed it systematically, it has these advantages over the more ordinary methods: it requires a far less quantity of ether, it seldom or never produces sickness or excitement, it brings on anæsthesia more rapidly, and leaves behind it much less unpleasant sensations than the more common methods. It is thus described: "Close the nostrils with raw cotton. Then take a pig's bladder of medium size, soften and inflate it after enlarging its aperture sufficiently to receive the patient's mouth, and pour into it one or two tablespoonfuls of rectified ether. Apply the edges of the aperture

¹ Lond. Med. Gaz., xxix. 821.

² Annales de Thérap., v. 60.

carefully over the patient's mouth, and direct him to breathe freely. For twenty or thirty seconds no effect is produced; but, in from forty to fifty, signs of insensibility commence, and in about a minute it is complete. This state lasts from one to three minutes, and is maintained as long as may be necessary by applying the bladder anew. In more than two hundred experiments that I have made, I have repeatedly weighed the ether remaining after the production of complete anæsthesia, and found the original quantity diminished by no

more than half a scruple.

"Although so small a quantity of ether is required to produce insensibility, it must reach the lungs in a certain degree of concentration, and hence the bladder should contain much more of it than will be actually inspired. This is the capital point in administering ether. The unpleasant symptoms which have sometimes attended its use arise from its too copious dilution with atmospheric air, and thus, too. the process is unnecessarily prolonged. A difficulty in other methods is the use of too large a quantity of ether, which oppresses the breathing, but no such effect takes place in this one, when only a due proportion of the fluid is used. It is very important that the breathing of the patient should be regular and free, and therefore it is well to inspire his confidence by allowing himself to apply the bladder to his mouth, until the commencement of insensibility requires that an assistant should take charge of it.

"In the long course of my experiments, the use of such a method as I have described has uniformly succeeded in producing the due effect in from fifty to eighty seconds, and always without any excitement, anxiety, or suffocation. If it is objected that a bladder of the size recommended is incapable of containing air enough for respiration, I reply that it results from actual trial that an ordinary pig's bladder contains air enough to sustain the respiration of an adult during from eighty to one hundred seconds, a much longer period than the average time of inhaling the ether. The highest praise that can be given to the method here recommended is, that it has, in my hands, succeeded uniformly and without difficulty or mischance of any sort, and that the patients return to consciousness directly after the operation, and without experiencing the slightest inconvenience."

CHLOROFORMUM VENALE.—Commercial Chloroform.

DESCRIPTION.—This substance is composed of two atoms of carbon, one atom of hydrogen, and three atoms of chlorine. Now the same proportion of carbon and hydrogen united with three atoms of oxygen constitute formic acid. They are hence supposed to form a basic compound, formyl, the union of which in the present case with chlorine was intended to be indicated by the term chloroform. To express the same idea more precisely, Liebig has named it perchloride of formyl.

Chloroform is a clear, limpid fluid, of sp. gr. 1.45 to 1.50; it is not

inflammable, but its vapor burns with smoke and a green flame. It is very volatile, and boils at 141° F. It has a fragrant, fruit-like odor, and a sweet taste at first, which afterwards becomes burning and pungent. It is a very slightly soluble in water, but is completely so in alcohol or ether. Dr. Snow states that it is soluble in 288 times its volume of water. It readily dissolves camphor, caoutchouc, guttapercha, wax, resin, iodine, and some other substances. Its drops are very small, eight of them on an average being equal to two minims. Its vapor is more than four times as heavy as atmospheric air, and more of it is taken up by the latter at a high than at a low temperature. Thus, 100 cubic inches of air at 40° F. will absorb only seven cubic inches of the vapor of chloroform, but at 90° F. it will absorb fifty-five cubic inches.. During the evaporation of chloroform cold is produced, but not so much as during the evaporation of ether.

HISTORY.—Chloroform was discovered in 1831, almost simultaneously by Mr. Guthrie, of Sackett's Harbor, N. Y., and by Soubeiran, of Paris. In an account of it published by the former in January, 1832, it is stated that "he had used the product very freely during the previous six months to the point of intoxication; that he had found it singularly grateful, producing promptly a lively flow of animal spirits and consequent loquacity, and leaving little of the depression consequent on the use of ardent spirits; that it promises much as a remedy in cases requiring a safe, quick, energetic, and palatable stimulus; and that for drinking it requires an equal weight of water." In 1833, Dr. Black, of Bolton, Eng., spoke of it as a new remedy, "brought into use by our American brethren," and recommends it in spasmodic asthma and in adynamic states of the system, In 1834, Dumas determined its true elementary composition, and gave

it the name of Chloroform.

The following account of the medical properties of chloroform is contained in the seventh edition of the United States Dispensatory, published in July, 1847, and consequently before Dr. Simpson's experiments, to be presently described: "It acts as a diffusible soothing stimulus in the same manner as sulphuric ether, but with this decided advantage, that when sufficiently diluted it possesses a bland, sweet taste, which renders its administration easy even to children. It has been used with advantage in asthma, spasmodic cough, the sore throat of scarlet fever, atonic quinsy, and other diseases in which a grateful and composing medicine is indicated. Professor Ives and Dr. N. B. Ives, of New Haven, speak favorably of its effects. The dose for an adult is a teaspoonful diluted with water. In affections characterized by difficult respiration it may be used by inhalation."

Through an earlier edition of the work just quoted it was in 1838-9 introduced into the medical practice of Liverpool by Mr. Waldie, an apothecary, and Dr. Formby, a physician, of that town, and by the former of these gentlemen it was, in the beginning of November, 1847, recommended to Dr. Simpson as a substitute for sulphuric ether. Dr.

¹ Lancet, 1847, ii. 631, from Silliman's Journal for Jan. 1832.

² Lancet, 1847, ii. 687.

S. was at that time endeavoring to discover, by experiments upon himself and several friends, some anæsthetic agent superior to ether. Upon inhaling chloroform, the party grew exhilarated, and several of them soon afterwards became insensible. With joy, yet not wholly without apprehension, the conductor of the experiments hailed this sudden but complete disclosure of a power which was to connect his name forever with one of the most remarkable events in the history of medicine, and, after satisfying himself by renewed experiments of the reality of his discovery, he put it to a public test by rendering insensible a patient on whom Professor Miller was about to operate for necrosis of the radius. From this moment the use of chloroform as an anæsthetic agent spread rapidly over the world, and gradually supplanted sulphuric ether in the medical circles of Europe and in many parts of the United States. But it never enjoyed in this country the exclusive

popularity it attained abroad.

ACTION. On Animals.—In an essay published by Dr. Glover in 1842, it was stated, among the effects of chloroform upon the lower animals, that the lungs become congested and the spinal cord loses its sensibility. In 1847, M. Flourens, while experimenting on the different varieties of ether, observed that "an animal subjected to the inhalation of chloroform became completely etherized; the posterior roots of the spinal nerves were found insensible, and several of the anterior roots lost their function.3 According to Gruby,4 the arterial blood is as red after the inhalation of chloroform as before it, perhaps even redder, and the venous blood has a brighter color than the arterial blood naturally possesses. But this assertion is contradicted by nearly all other experimenters. Amussat, for example, showed by very carefully conducted experiments that when a vein and an artery in an animal's limb are exposed so as to exhibit their contrasted hues, and chloroform is then administered, the latter vessel begins to darken as soon as the animal's sensibility declines, and finally approaches the vein in color. The blood also which jets from it on being punctured has the aspect of venous blood. But the instant inhalation is suspended the natural color of the fluid returns. This rapid restoration to its normal condition explains perhaps why some experimenters have supposed the blood to remain unchanged during anæsthesia.

Duméril and Demarquay found that anæsthesia caused the temperature of animals subjected to it to fall several degrees; but this seems to have resulted only from the prolonged action of chloroform or ether.

The influence of individual susceptibilities, of the dose, and of the mode of administration, has been very clearly illustrated by Mr. Nunneley's experiments. Under circumstances as nearly alike as possible, the effects were by no means identical, and even in the same animal they were far more decided at one time than another. The

¹ Surgical Experience of Chloroform, by Prof. Miller, p. 10.

Lancet, 1847.

Revue Médicale, ciii. 442.

Revue Médicale, civ. 125.

⁶ Trans. Prov. Med. and Surg. Assoc., xvi. 319.

intensity of the effects appeared to depend upon the quantity of chloroform inhaled in a given time. Thus, a small quantity suddenly and
quickly inhaled for a short space of time will produce not only more
rapid and decided, but also far more dangerous effects than a larger
quantity will do if taken more slowly, and consequently in a less concentrated form. A high temperature, which insures a speedy conversion of the chloroform into vapor, produces anæsthesia very rapidly
and decidedly, and for a longer time. Consequently, whatever increases unduly the volume of the vapor inspired increases also the
danger of the inhalation.

Prof. Simpson and Mr. Nunneley found that in the lower orders of animated creatures, such as fish, frogs, snails, and certain insects, it was easy to produce a local anæsthesia. In many instances, too, the local effect was followed by general insensibility, a result which doubtless depended upon the active absorbent power of the integuments of these animals. But local anæsthesia is not so easily produced in the larger mammiferæ, and hence in man the advantages of this method are restricted to cases in which the cautery is applied, or some other superficial operation is performed. In Mr. Nunneley's experiments on frogs and toads, limbs which had been subjected to the vapor of chloroform were excised piecemeal without the animals betraying any signs of pain. An inferior degree of insensibility was produced in the limbs of rabbits and dogs by prolonged immersion in the vapor of chloroform.

On Man.—Locally, and when its evaporation is prevented, chloroform acts as an irritant, and even promptly vesicates the skin. At
the same time, it diminishes the sensibility of the part to external
impressions. But the latter effect is very transient, while the former
is of considerable duration. The vapor of chloroform, however, may
be used to produce local anæsthetic effects without greatly irritating

the part to which it is applied.

Taken internally in the liquid form, it produces a sense of heat in the stomach, and a diffusive warmth resembling in some degree that which is caused by alcohol. According to Dr. Henry Hartshorne, "a fluidrachm of chloroform, taken by the stomach, is not more than equal, in soporific effect, to thirty or thirty-five drops of laudanum," and a dose of seventy-five drops blunts the general sensibility, as well as the special senses, produces drowsiness, and reduces the pulse two beats in a minute. This action on the pulse is not observed when chloroform is inhaled, nor was such an effect very marked in any of the following cases of poisoning by its internal use.

Mr. Dean reported the case of a lady weakened by a miscarriage, and subject to spasmodic attacks, who nearly lost her life from taking half an ounce of pure chloroform. She was seen within five minutes afterwards. The symptoms presented were as follows: General convulsions, total insensibility, dilated pupils, trismus, a slightly flushed face, a full and rather oppressed pulse, and foaming at the mouth. After the stomach was emptied, brandy was administered with evident advantage, and, although several relapses occurred, the

¹ Am. Jour. of Med. Sci., Jan. 1854, p. 113.

² Ibid., Oct. 1848, p. 353.

lady finally recovered. The action of the heart during the week was singularly feeble and irregular, "one moment slow and labored, every third beat prolonged, at the next, small, quick, and fluttering, and then a prolonged stop."

A case closely analogous to this has also been reported. The patient was a female, twenty-one years of age, who had swallowed two ounces of pure chloroform. She was found within twenty minutes afterwards in a deep stupor, the pupils contracted, respiration regular, pulse 70, soft and full; the face not congested. External irritants were applied; the stomach pump used; and brandy and ammonia given. The respiration then became slow and stertorous, the pulse fell, and the face was livid. Galvanic shocks were employed, and continued for two hours, with stimulating enemata, and heat to the limbs. The respiration fell to two in a minute; the pulse at the wrist was almost imperceptible. The remedies were persevered in, and reaction gradually took place. In five or six hours from the commencement consciousness returned. On the following day there was thirst, nausea, pain in the abdomen and in the lumbar region, and frequent and very bloody stools. In about a week recovery was complete.*

Dr. Lawson, U.S.A., has reported the case of a man who also took two ounces of chloroform, and presented essentially the same symptoms as those in the above narrative. They were, however, less grave. Two similar instances have been reported in London. In the one two fluidounces of pure chloroform were taken, and in the

other an unknown quantity of this liquid mixed with oil.4

It is believed that there is only one case on record of death from the narcotic, as distinguished from the irritant, action of chloroform taken into the stomach. A man, aged thirty-five years, who had swallowed an uncertain quantity of chloroform, fell into a state of narcotism and insensibility similar to that in the cases already related. Gradually, and under the use of galvanism and other stimulants, the temperature of the body and some slight degree of consciousness and sensibility were restored, and profuse perspiration broke out. The head became hot, and the pulse frequent and tolerably hard. There was no complaint of pain and no vomiting, but death ensued with signs of pulmonary asphyxia. On examination of the body, congestion of the brain and of the posterior part of the lungs was found, and the bronchia were choked with frothy and slightly reddish mucus. Venous congestion existed in the cardiac extremity of the stomach.

In other cases the irritant action of the poison was predominant. In 1852, at Edinburgh, a robust man, in a state of intoxication from alcohol, swallowed an ounce or two of chloroform from a vial containing eight ounces of this liquid. The remainder was nearly all spilled upon the floor. Several hours afterwards, probably six or eight, he was found insensible, breathing extertorously, his face livid, his pupils dilated, and his pulse at 60, full and

• fbid., May, 1862, p. 478.

¹ Times and Gaz., Dec. 1857, p. 615.
² Annuaire de Thérap., xviii. 55.

^a Am. Jour. of Med. Sci., Oct. 1857, p. 367.

⁴ Times and Gaz., May, 1862, p. 577; Ibid., Oct. 1863, p. 378.

Evacuant and stimulant remedies were employed, and his consciousness fully returned. He now began to suffer from gastric irritation, vomiting all ingesta, and to complain of symptoms affecting the air-passages. In about thirty-six hours he died of suffocation. On examination of his body, the mucous membrane in the pharynx, larynx, and trachea, was of a crimson-red color, and in the trachea it was covered with patches of a soft, yellowish, purulent exudation, and the bronchi to their extremities were filled with a dirty-gray, purulent fluid. The cause of death was evidently an inflammation of the air-

passages excited by the irritant action of chloroform.1

Dr. Junius Williams has reported the following case: An intemperate female, while intoxicated, swallowed an ounce and a half of chloroform. For a few minutes she was elated, singing and dancing, and then fell insensible. Her breathing was stertorous, pulse feeble and rather slow, pupils contracted and fixed. She remained insensible for ten hours, then complained of burning in the fauces, œsophagus, and stomach. Vomiting and purging of an offensive fluid succeeded, with burning pain at the epigastrium. The thirst was insatiable; pulse 100. In thirty-six hours she died suddenly, with a congested state of the face, and liquid filling her mouth and nostrils. The mucous membrane of the stomach was found softened, and reddened in The blood was fluid. There were no other lesions.2 streaks.

In another case, reported by Dr. Bain, a female took a wineglassful of chloroform mixed with water. Four hours and a half afterwards she lay insensible, the countenance pale, the pupils contracted, and but slightly influenced by light, the pulse 84, and moderately fall, total insensibility of every part; breathing abdominal, no stertor. Vomiting was produced by the stomach-pump, and stimulants applied to the skin. In eleven hours consciousness had returned, and with it great complaint of gastric distress. Death from gastritis took place on the eighth day. The mucous membrane of the stomach was red, softened, and eroded, especially near the cardia, and ulceration was found near the pylorus. The lungs, heart, and cesophagus

were healthy.3

The phenomena produced by inhaling chloroform do not differ essentially from those that ether occasions, but they are more strongly marked. The stage of excitement seldom occurs during the inhalation of chloroform for surgical purposes, and is always extremely brief. In some of the experiments of Dr. Hughes Bennett, laughter and extravagant gayety and humorous gesticulations, accompanied with sensations of a highly pleasurable description, were produced by small doses of the vapor, symptoms, in fact, identical with those which the inhalation of nitrous oxide gas has rendered familiar. Like this agent, also, chloroform sometimes develops, in persons of the coarser sort, a furious pugnacity. But whatever tendency to such manifestations may exist under the first impression of chloroform, as commonly employed, it is speedily and completely subdued by the rapid encroachment of

³ Lancet, April, 1850, p. 400.

Month. Jour. Med. Sci., v. 77.

² Philadelphia Med. Exam., Nov. 1856, p. 659.

the anæsthetic state. The gradation of the symptoms has been accurately described by Simpson, Snow, and many others. After the first two or three full inspirations, a feeling of warmth and excitation is experienced, radiating from the chest to the extremities, followed by whirring noises in the ears, a sensation of vibratory thrilling and benumbing throughout the body; with, at times, a rapid loss of sensation and of motion, and, at last, of consciousness. In the first part of this stage sensibility may be blunted while consciousness remains, particularly if the vapor be inhaled very gradually. For the greater number of minor operations, and for obstetric practice, unless when it is intended to arrest powerful uterine action, the degree of anæsthesia produced at this stage is sufficient. So complete may the loss of sensation be, without the consciousness being impaired, that, as Dr. Snow states, he has seen a child unconsciously handling its toys all the time that the operation of lithotomy was performed on it. Commonly, however, the use of the knife occasions expressions indicative of pain, which are either not remembered, or are recollected as having occurred in a It is certain, says Dr. Snow, that chloroform may prevent pain in two ways, either by rendering the mind unconscious of external impressions, or by removing the sensibility to these impressions, that is, by a true anæsthetic action, but usually, and always when breathed in a full dose, it acts in both ways at once. The patient sometimes supposes that he remembers all the particulars of the operation, although he did not feel the pain, but on questioning him it is usually found that it is a dream which he remembers, and not the actual facts.

During the full anæsthetic sleep produced by chloroform, sometimes no mental action goes on, or at least is remembered; in many others the mind is active, as in dreams. The respiration is usually at first soporose, or, as Meinel describes it, quicker and fuller at first, then slower, and at last almost suspended; the pupil is sometimes natural, in other cases slightly contracted, in others again dilated; the pulse is usually increased both in force and frequency at first, and afterwards falls, nearly, or quite, to its normal rate; even if the vapor is exhibited very long, and in very powerful doses, the pulse seldom becomes weaker or falls below the natural standard; the muscles of voluntary motion are in general relaxed; more rarely cataleptic; still more rarely rigidly contracted, as happens also occasionally with ether.2 This phenomenon is most usual in active and robust persons. females, spinal symptoms are most apt to occur, the unconsciousness being sometimes accompanied by sighs, sobs, partial rigidity of the arms, more or less excitement, and a group of phenomena usually denominated hysterical.3

The extensive and careful experiments of Mr. Nunneley led him to a singular conclusion in regard to the modus operandi of chloroform. From the possibility of producing local anæsthesia, and from the more rapid action of the vapor through the lungs than through the stomach, Mr. Nunneley concluded that the primary and direct action of the

^{&#}x27; CABSTATT, op cit., 1849, p. 184.

Dr. BERNETT, ibid., p. 540.

Month. Jour. of Med. Sci., viii. 416.

vapor is upon the nerves. He appears to believe that the anæsthetic influence is propagated through these organs, whereas it is conclusively proven by his own experiments, taken in connection with those that demonstrate the rapid entrance of anæsthetic vapors into the bloodvessels, that it is through these channels that vapors are brought into contact with nervous trunks and centres. A very conclusive experiment upon this subject was performed by M. Coze, of Strasburg. He states that a limb can be protected from the influence of chloroform inhalation, by merely compressing the main artery that supplies it. Immediately on removing the pressure, and restoring the circulation, the limb becomes insensible.

The superiority of chloroform over ether, as a rapid and effectual anæsthetic, caused the latter agent to be in a great measure abandoned by surgeons and accoucheurs in Europe; but the fatal consequences which so often resulted from the employment of chloroform gave a shock to the conscience of the profession which has led to the more circumspect use of it. We believe that surgeons are more solicitous than they formerly appeared to be, to learn from persons more competent than their special vocation permits them to become, whether the patient is or is not affected with a disease or constitutional peculiarity which should forbid the use of chloroform. One portion of the risk may thus be mitigated; but neither this precaution nor any other can avert the danger which appears to be inherent in chloroform, and to be greatest precisely when the necessity of resorting to anæsthesia is least urgent, that is to say, in operations which are trivial in severity as well as duration.

As early as 1850 not less than forty-eight cases of death from chloroform had been published. During 1852 sixteen fatal cases were published, of which eight occurred in the United States and six in Great Britain, and four of them after the simple operation of extracting a tooth. In 1853 Mr. Crisp collected forty-two cases of recorded deaths from this agent.² In February, 1857, Mr. Holmes gave fifty as the total number of deaths from chloroform in surgical operations;3 since which time we have found eighteen similar cases in the medical journals, and in a single one, for the first half of the year 1859, not less than seven cases. Yet, just before Dr. Snow's death, in June, 1858, this gentleman stated the number of fatal cases at fifty. From 1858 to 1864 at least fifty additional cases of death by this agent were published. All of the summaries of such deaths professing to be complete are really very imperfect. Thus in the voluminous treatise of MM. Perrin and Lallemand, printed in 1863, a synoptical table is given of seventy-seven sudden deaths during anæsthesia from chloroform, in which four are set to the account of America. Yet in 1861 Dr. C. T. Jackson published a table containing nine such cases which had occurred in this country alone, not one of which is contained in the foreign list. If we were to know of all which occurred without having been published, and in rural districts, as well as in towns where

¹ Annuaire de Thérap., 1850, p. 39.

^{*} RANKING's Abstract (Am. ed.), xxv. 222.

² Lancet, June, 1853, p. 523.

^{&#}x27; Times and Gazette, June, 1859.

such events are eagerly seized upon by the agents of the press, we should have, in all probability, greatly to extend the melancholy catalogue. To give a single illustration of the correctness of this remark, M. Barrier states that five deaths from the inhalation of chloroform had, to his knowledge, taken place at Lyons, and that one only was

published.

It is true that of these cases a portion may be set to the account, in part at least, of other causes than chloroform inhalation, such as the debility, alarm, or diseased condition of the patients. Berend, indeed, who published the first collection to which reference is here made,* admits eleven cases only as direct and unequivocal instances of death by chloroform; but it seems impossible to deny the not less real, although less immediate, fatal influence of this agent in nearly all of the remaining examples. It is also true, as charged by Dr. Nunneley, that "even in those cases which have come to light, all sorts of explanations, and attempts to explain away the true cause of death, have often been attempted, rather than admit the fact of the person having been killed by chloroform." But an examination of the published reports must convince any one that in very nearly all of them death was owing rather to some individual susceptibility to the action of the vapor than to the mode in which it was inhaled. The fatal consequences which have been alluded to seem to have made no permanent impression upon medical men. As one of the historians of the subject remarks, the effects of the agent were studied like those of an ordinary medicine; indications and contraindications were laid down, and rules given for its use; experiments on its physiological action and its mode of administration were performed. An exclamation of terror was no longer heard when patients perished suddenly under its inhalation, but the circumstances of the fatal event were discussed as subjects of scientific interest, and the causes of death sought for in the liquid itself, and in its relations to the living organism.4 It is a doubly melancholy fact that a large proportion of deaths by chloroform have taken place, not during capital operations in which the administration of an anæsthetic was justified by the apprehension that the patient would sink under the shock of pain, but on occasions when the pain to be inflicted by the surgeon could only have been slight, or, if severe, momentary. In the list of fifty cases published by Dr. Snow, there is not a single instance of a capital operation, and in twenty-four of them the patient perished before even the intended operation had been commenced. The very last example of fatal poisoning by chloroform inhalation, which presented itself as the sheets of the first edition of this work were preparing for the press, was one in which a healthylooking girl of fifteen, affected with strabismus, died in the surgeon's hands when the operation was hardly begun. Time has afforded no grounds for modifying the statements or qualifying the opinions which are here expressed; on the contrary, it has confirmed them all, and intensified our amazement at the reiteration of the same dismal or

5 Times and Gazette, June, 1859, p. 581.

¹ Lancet, Aug. 1857, p. 225.

² Chloroform Casuistik, Hannover, 1850.

shocking details without any sign of conscious guilt, or any evidence of remorse, upon the part of those in whose hands human life has been wantonly sacrificed.

The causes of death are regarded very differently by different ob-Stanelli' maintains that asphyxia is the fatal agent, and may operate in either of several modes: 1. The vapor being administered in too concentrated a form, excludes the atmospheric air, or supersaturates the blood so that it no longer acts as a natural stimulus to the system, or else it occupies the place of the blood in the vessels, and so paralyzes the heart. 2. The system being overcharged with the vapor, its normal actions proceed imperfectly and irregularly, and death is the result. 3. The respiration is impeded by mucus at the entrance of the larynx, or else by a too close application of the respirator to the mouth and nose. It is chiefly upon the last of these propositions that Stanelli dwells, but it is of questionable soundness; for, as has been asked by Berend, is not mucus or saliva that has reached the glottis always swallowed? Why, if this be the cause of death, are not the fatal cases more numerous? and why, above all, is not this mechanical impediment found after death? To which objections may be added the more weighty one that the mode of death is seldom like that by suffocation, either in the rapidity with which it supervenes, or in the phenomena which accompany it. A review of the fatal cases furnishes a very uniform result, and shows but few symptoms as precutsors or concomitants of death. In a very small number more or less twitching of the muscles of the face and extremities, and in two or three instances spasmodic contraction of the muscles of the posterior part of the trunk, have been noticed; but, in general, the breathing grows feeble and infrequent, the pulse small and faint, and the face pale and cold. In a smaller proportion of cases the features are congested instead of pallid, and in these the respiration is more or less stertorous, and there is sometimes foam upon the lips. The former group of cases seems to indicate a direct poisonous action of the chloroform, while in the latter are superadded the effects of an exclusion of atmospheric air—the signs, in other words, of asphyxia.

The condition which precedes, and is the cause of death by chloroform, is regarded by Mr. Snow as a paralysis of the heart. In nearly
every fatal case, the right cavities of this organ are found distended
with blood which had so impeded its action as to produce a more or
less sudden, but always a rapid, extinction of life. Death, in fact, takes
place by syncope, which is a sudden and more or less complete loss of
sense and motion, and may be produced by any cause which arrests
the cardiac circulation; by the withdrawal, e. g., of the nervous power
on which the movements of the heart depend, and which may coexist
with emptiness of the heart on the one hand, or its congestion on the
other. From the symptoms observed in death by chloroform, and

Was ist der Chloroformtod, &c.? Berlin, 1850.

² Consult also Gosselin, Arch. Gén. de Méd., 4ème sér., p. 385; Drs. Sibson and Snow, quoted in Am. Jour. of Med. Sci., July, 1849, pp. 274 and 278; Braithwaite's Retrospect (Am. ed.), xvii. 306; Robert, Bull. de l'Acad., xiv. 1091; Orfila, op. cit., ii. 714.

which are above described, it may be inferred that the former of these causes is less frequent than the latter. Dr. Glover is of opinion that the tetanic spasms in some cases, and epileptiform convulsions in others, show a direct poisonous action of the vapor upon the brain and the spinal cord. Dr. Kidd regards paralysis of the respiratory muscles with spasm of the glottis as the first step in death by chloroform; the second as engorgement of the pulmonary veins, and of the right side of the heart. But this mechanism would produce asphyxia, not syncope. Not only are the direct and immediate effects of chloroform of a pernicious tendency, they are so far cumulative as to betray their poisonous qualities even after inhalation has ceased. Dr. Snow observed the insensibility to increase for twenty seconds after the inhalation had been left off, and unless, therefore, extreme precaution is observed in administering the vapor, a deadly dose of it may be given

before any sign of danger is betrayed.

The above considerations furnish a reason why the use of chloroform as an anæsthetic should be avoided in those affections of the lungs which predispose to asphyxia, and in those conditions of the heart and blood which favor the production of syncope. The shock of severe accidents, mental excitement or depression, constitutional or accidental debility are, therefore, so many contra-indications to its use, but they present less serious obstacles to the employment of sulphuric ether. Dr. Warren presents, in a few words, the comparative merits, in surgery at least, of these two anæsthetics when he says, "Ether is generally safe; chloroform cannot be said to be safe in any case, . . . no practitioner can be reasonably assured in his own mind that it will not prove fatal the next time he employs it." But if the consideration of danger be left out of the comparison, there can be no question of the superiority of chloroform to ether as an anæsthetic. Its advantages may be thus summarily stated, after Speyer, Simpson, and others: 1. A less quantity of chloroform than of ether is requisite to produce the anæsthetic effect. 2. Its action is more rapid and complete, and generally more persistent. 3. Its influence is far more agreeable. 4. Considering the quantity used, it is much less expensive. 5. Its perfume is pleasanter, and less adherent to the clothing, &c. 6. It is much less inflammable, and may, therefore, be more safely employed by night. Unfortunately, the "consideration of danger" is that precisely which we are under the strongest obligations to regard. If a remedy is dangerous, we are morally bound not to use it, unless withholding it involves a greater danger still. If the degree of anæsthesia necessary for the due performance of the graver surgical operations is such as to imperil life, and that, too, without any possibility of our anticipating and guarding against the danger, the surgeon who employs it assumes a responsibility of life and death, for which neither his office nor the moral law affords him any license.

Prolonged experience has served to confirm the conclusions which have just been given, and which may be thus summarily expressed:

* CANSTATT, op. cit., 1849, p. 184.

¹ Lancet, Nov. 1858, p. 469.

^{*} Lancet, Nov. 20th, 1847, p. 549.

Vol. II.—8

Ether is capable of fulfilling the same indications as chloroform without exposing to the same danger. In 1859 the Medical Society of Lyons declared, after a full discussion of the subject, that ether is less dangerous than chloroform; that anæsthesia may be produced by the former as constantly and completely as by the latter; that if the embarrassment attending the administration of ether is greater, it is still not to be compared with the positive dangers inherent in the use of chloroform; and, consequently, that the preference ought generally to be given to ether over chloroform.

Now, if we consider the minute precautions which are enforced by those who, like Dr. Snow, have had the largest experience in administering chloroform; the abandonment or rejection of it by a large number of the most experienced and judicious surgeons in the United States, and by many in Europe; the fact that, besides the absence of all outward sign to indicate whether the patient is fit or unfit for the use of chloroform—in some cases the fatal effect is produced by an exceedingly small dose—and that the danger bears no proportion at all, or, if any, an inverse proportion, to the severity of the operation, it must be admitted that the question whether its use as an anæsthetic in surgery should be persisted in, is one of extreme gravity, and which it is more than probable will ultimately be decided in the negative. Meanwhile, it cannot be denied that chloroform has been administered thousands of times, in almost every description of surgical operation, and, apart from the comparatively rare exceptions above noticed, without any evil result. Yet it is probable that ether would have secured all the advantages, with few, if any, of the dangers which attach to chloroform; and when it is considered that the chief danger is nothing less than the destruction of human life by the very hand which is professedly endeavoring to save life, the question becomes one of such gravity that it should be decided in the court, not of science, but of conscience and morals.

Other consequences than fatal ones, but still seriously to be deprecated, have been observed to result from the use of chloroform. of these is the circumstance that during the stage of excitement, or even of imperfect insensibility, it prompts to expressions and movements which betray sexual propensities, particularly in females; and although it has been alleged that such exhibitions have usually occurred in the case of dissolute individuals, the fact is not exclusively so. The objection, also, such as it is, applies with even greater force to ether than to chloroform. Still, it does not follow that, on this account, the benefits of the medicine should be withheld from the great mass of those to whom, on general grounds, it is appropriate. Sickness of the stomach has been observed in many instances after the inhalation of chloroform, but it has generally been produced when the vapor was exhibited immediately after a meal, or, on the other hand, after long fasting. In the latter case it has, in some instances, been of considerable duration, and accompanied with more than usual depression. (Snow.) It may generally be checked by a little brandy

¹ Annuaire de Thér., xxi. 44.

and water, or an opiate. A more common but remote effect of chloroform is headache, with a sensation of giddiness, and excitement or general nervousness which has, in some cases, been perceived even for months after the inhalation. Dr. Happoldt has published the case of a person who, for the relief of asthma, inhaled chloroform to the extent of twenty ounces in forty hours. The attack was cured, but the sense of smell was abolished, and that of taste perverted. The bladder and rectum were paralyzed, the latter remaining torpid for several months. The sexual appetite was for many weeks abolished. In a second case by the same physician, four ounces of chloroform were inhaled. Consciousness was suspended for ten hours. For more than a month ordinary articles of food lost their proper savor; the sense of smell was for the same period nearly abolished, and the nostrils nearly closed by the swelling of their lining membrane. As in the other case, the bladder and rectum were torpid, and erections of the penis were impossible.1 The most serious of the secondary consequences attributed to the inhalation of chloroform, is the production of insanity. Four or five cases of this nature are related by Dr. Webster, of London; they all occurred, however, after parturition, and may, therefore, not without reason, be suspected of being ordinary examples of puerperal mania. The only case which affords any real grounds for the charge alluded to, is the following:—

A female, 20 years of age, inhaled chloroform for the purpose of having a tooth extracted. She recovered apparently from its influence, and walked home, the distance of a quarter of a mile. Her conversation was incoherent, and her gait unsteady. Soon afterwards she lost both sense and motion, the skin was cold and pale, the respiration jerking, and the pulse feeble; no rigidity of the muscles. She came out of this state and then became "furiously insane." There was constipation and deficient urine. This condition lasted for a week

or ten days, and then her usual health was restored.3

Uses. In Surgery.—Little need be added to what has been said under the head of ether, respecting the inhalation of chloroform in surgery, except to qualify the statements there made, by suggesting the necessity of greater caution in using the latter agent. Its advantages consist in the rapidity and durability of its influence, and the comparative absence it insures of those symptoms of excitement which hinder the surgeon in the execution of his duties.

In operations upon infants and young children, M. Guersent, whose vast experience carries with it an acknowledged value, regards the employment of chloroform as of incalculable importance. By its means the resistance of the patient, which under ordinary circumstances, offers so serious an obstacle, is completely overcome, and the operation is performed with singular rapidity and ease. This is strikingly the case in operations for stone. Dr. Keith considers that ansesthesia greatly augments the feasibility and success of lithotrity in young persons, and indeed renders it easy, when without this aid it would

Charleston Med. Jour., xi. 60. Psychological Journal, iii. 269.

Dr. B. H. CLARKE, Boston Med. and Surg. Jour., Feb. 1855, p. 84.

Bullet. de Thérap., xxxvi. 50.

Month. Jour. of Med. Sci., ix. 662.

be impossible. It is fortunate that death from chloroform inhalation is almost unknown in surgical operations upon children. Dr. Snow states that he administered chloroform in 155 cases of lithotrity and 91 of lithotomy.

In respect to its usefulness in ophthalmic surgery, opinions are divided. Jüngken¹ regards it as eminently serviceable in persons of an irritable temperament; when the eyes have become morbidly sensitive to light, so that the lids and muscles of the ball contract spasmodically; when the patient, from having been born blind, or from other causes is unable to control the movements of the organ; in infants and children, generally, for operations that involve the eyeball, or for the mere extraction of foreign bodies from the surface of the conjunctiva; in all long and painful operations on the eye, such as the extirpation of tumors, &c. As in several operations, the ball must be firmly fixed, it is necessary to counteract the mobility of the organ, which the anæsthetic state increases, by steadying the ball with the same finger which depresses the lower lid.

It is maintained, on the contrary, by several ophthalmic surgeons, and by Mr. Wilde, of Dublin, amongst others, that anæsthesia impedes operations upon the eye because the active co-operation of the patient is thereby prevented. In that for strabismus, for instance, it cannot be known whether the contracted muscle is divided or not; in extraction of cataract the patient cannot give the globe of the eye a proper inclination, &c. Besides, according to Mr. W., there is a danger of convulsions which must prevent all operation, and the slight degree of pain usually required to be inflicted, renders anæsthesia unnecessary. These objections do not, as will be seen, destroy the force of Jüngken's recommendations, which are addressed to cases of daily occurrence, less than to such as on account of the age, or the susceptibility of the patient, are surrounded with difficulties which impede the due performance of an operation, if they do not entirely prevent it. It is believed, however, that the preference of ophthalmic surgeons for chloroform is decided. Mr. H. Walton has pointed out its advantages in detail, and represents them as very great. The straining of the eye which has sometimes occurred during the vomiting which is apt to follow anæsthesia, he obviates by means of an appropriate pad and bandage over the affected organ. Dr. Snow refers to a large number of cases in which this agent was employed in operations for cataract, strabismus, extirpation of the eyeball, the removal of foreign bodies, entropion and ectropion. To these may be added cases of extraction of foreign bodies from the nasal passages, the auditory canal, the vagina and rectum.

It is unnecessary to pursue any further a description of the different operations which have been performed with the assistance of chloroform. Suffice it to say that there is none in which it has not been invoked, from the most serious, such as lithotomy, amputation of the thigh, extirpation of tumors, plastic operations, and the reduction of

¹ Annuaire de Thérap., 1852, p. 69.

³ Times and Gaz., Jan. 1855, p. 79.

² Caustatt, op. cit., 1849, p. 189.

dislocations, down to the most trivial, such as the extraction of teeth and tenotomy. Its advantages, as stated by its advocates, are that by preventing pain it renders many operations easy, as in children, which were otherwise impracticable, either on account of the severity of the pain or its duration, and it induces many persons to submit to necessary surgical treatment with cheerfulness and tranquillity who would, under ordinary circumstances, have refused the interference of the surgeon altogether, or been seriously injured by the pain itself or the apprehension of it. How far it influences the rate of mortality after capital operations is a question still undecided, or rather which has been decided differently by different investigators. While Dr. Simpson, Dr. Snow, and Mr. Fenwick, allege an increased success of the operations performed since the introduction of anæsthetic agents, which, however, they do not attribute solely to their influence, Dr. Arnott assigns "chloroform as the cause of the great increase of mortality after the severer operations, from its having proved itself a virulent poison by the numerous sudden deaths that have followed its administration, from the great and lasting prostration that is so often produced by it, and particularly from the frequent observation that this prostration and other allied symptoms have continued until the death of the patient." Dr. Arnott maintains further that "an increase of mortality after amputation and lithotomy has occurred since the introduction of chloroform, to the extent of twelve per cent. as regards the first of these operations, and twenty-four as regards the other."3 It thus appears that gentlemen of equal probity and sagacity are at issue in regard to a question of fact. The one party affirms and the other denies with equal emphasis and conviction. The clinical records of other countries than England do not throw any light upon the question, for the mortality attributed to chloroform elsewhere is so slight that in the whole of Europe Dr. Snow could discover but twelve cases against thirty-eight in the British possessions and the United States of death from this agent.

It is to be observed that in the continental countries of Europe the mode of administering chloroform differs from that which prevails in England, in this, that the state of anæsthesia is less profound and complete, and therefore unattended with the same phenomena of narcotism. Even when an equal or a larger amount of the vapor is administered, its action is less concentrated and intense, and we consequently find that French and German surgeons dwell more upon its consecutive than its immediate dangers. Thus it is that M. Chassaignac speaks of these effects occurring from sixteen to forty-eight hours after the operation, the injury to the vital forces by the chloroform being so profound that the patient is unable to recover from it. In the Crimean campaign, we are informed by Medical Inspector Dr. Scrive, that in no single instance of thousands of cases was the administration of the anæsthetic the cause of the least accident of a serious nature, but he attributes this immunity to the fact that it was never allowed to produce com-

¹ Times and Gaz., 1857, ii. 539, 592, 641.

³ Ibid., Jan. 1859, p. 55.

² Ibid., May, 1857, p. 495.

plete muscular resolution. M. Baudens, also, in his account of the campaign in the East, asserts that, although chloroform had been employed thirty thousand times in the French army there, no fatal accident had ever resulted from its use. But Dr. Rizet, of the Chasseurs, denies this, and cites two cases that occurred under his own observations,² and Deputy Inspector-General Mouat, of the British army in the Crimea, charges it with being a cause of death under the same circumstances precisely as those pointed out by M. Chassaignac. peculiar state of nausea and depression," he remarks, "follows its use, in which perfect reaction is never thoroughly established, the desire for food never returns, and the patient sinks, as it were, stealthily, and dies from exhaustion, in from twelve to twenty-four hours." With these evidences of the primary and consecutive evils which chloroform may induce as an anæsthetic in the practice of surgery, we are justified in repeating the suggestion that its continued employment involves very serious considerations of a professional as well as of a moral nature.

In Midwifery.—The first cases of midwifery in which chloroform was employed were reported by Dr. Simpson and Dr. Protheroe Smith. Immediately afterwards its use became general in Great Britain. Some of the older obstetricians, however, opposed the new agent, and continue at the present time unfavorable to its use. Indeed, it is believed that the profession generally are much less addicted to its employment than was the case a few years ago. We shall take a survey of the facts and opinions which are recorded in reference to the use of chloroform during pregnancy and labor, and after confinement.

Chloroform has been administered by inhalation to allay the vomiting of pregnancy, which, it is well known, sometimes reaches an alarming and even fatal degree. M. Cazeaux was, we believe, the first to make this application of the medicine, and to announce its complete success in a very desperate case. By the stomach, chloroform has proved successful under these circumstances, as it has in several others of obstinate vomiting produced by various causes. The full narcotic effect of the vapor has been known to produce miscarriage. Such a case is related by Dr. L. G. Robinson as occurring in a robust lady, pregnant with her third child. She inhaled chloroform for the relief of a slight toothache, but fell into a semi-conscious and anæsthetic state, in which labor commenced.

During labor, chloroform, when propitious in its operation, diminishes or prevents all of those evil consequences which depend directly upon the patient's suffering. Among these one of the most formidable is convulsions. In so far as they depend upon the severity or the prolongation of uterine efforts, they may be with great certainty averted. When this suffering occasions great restlessness and irritability, and an alarm respecting the issue of the confinement, there is sufficient reason to apprehend epileptiform convulsions, and chloroform is the

¹ La Campagne d'Orient, pp. 465 and 468.

³ Times and Gaz., Aug. 1856, p. 225.

⁶ Ibid., Nov. 27, 1847.

⁷ Edinb. Med. Jour., iii. 268.

² Times and Gaz., May, 1859, p. 485.

Lancet, Nov. 20, 1847.

⁶ Abeille Méd., x. 183.

speediest remedy. This condition is to be distinguished from hysteriform excitement, which anæsthetics are more prone to aggravate than allay. If the convulsion depends upon advanced granular degeneration of the kidney, chloroform can be of little avail; but albuminuria and dropsy, to a considerable extent, may be present without any such anatomical lesion, and therefore the remedy should in no case be withheld. It occasionally happens that the sensibility of the generative organs is morbidly acute, so much so that the slightest manual interference on the part of the accoucheur, the progress of the child, or any instrumental manœuvres cannot be borne, or they give rise to extreme agitation, anguish, and exhaustion. Chloroform at once removes every obstacle to the free action of the medical attendant, and spares the

patient incalculable distress.

The influence of chloroform upon the uterine contractions is not always the same, although it generally depends upon the dose that has been administered. Yet we are assured by some that the ordinary average dose sometimes suspends uterine action altogether,' while the greater number of physicians find that in this dose the anæsthetic tends rather to render irregular contractions regular without at all diminishing their energy, while it produces a general calmness and composure in the highest degree propitious. It is very true that when chloroform is first administered, especially to a patient who is apprehensive of its effects, her pains may cease or become irregular, as they might do under any mental impression. This is a phenomenon made familiar by daily experience. It is, however, true that, apart from such mental influences, a diminished expulsive effort is occasionally met with as the direct effect of the action of the vapor. Dr. Robert Lee has taken advantage of the fact to charge against chloroform that "it very manifestly slackens the uterine contractions, and in some cases puts a stop to them altogether." This effect is admitted by Dr. Rigby, who, however, pronounces it to be very rare, and by Spiegelberg, who asserts that no one has seen such effects when the anæsthetic was properly administered. The voluntary activity of the abdominal forces, he contends, may disappear, but the involuntary action remains unimpaired.4 This also is the view taken by Dr. Murphy.5 He calls attention to the double motive power of the uterus; the reflex and the ganglionic. The former of these may be suspended by the ansesthetic influence, but the periodical and expulsive uterine efforts, it is said, will continue under the action of the ganglionic system of nerves.

The practical fact is, however, well settled that the precise action of the vapor cannot always be anticipated. As Dr. Snow has observed, in some cases the chloroform, even when very moderately employed, diminishes both the strength and the duration of the uterine contractions, and prolongs the interval between them. In other cases the inhalation causes the uterine action to become stronger and more

Lancet, Feb. 1856, p. 129; Chloroform in Childbirth, p. 17.

DANYAU, Bull. de Thérap., xlvi. 534.

² Lancet, Dec. 1853, p. 609; Times and Gaz., Sept. 1854, p. 260.

regular, by removing the excess of sensibility by which it had been interfered with. In some cases, also, says Dr. S., "chloroform seems to act as a direct stimulant to the uterine contractions, increasing their force and frequency—a circumstance at which we need not be surprised, when we remember that both opium and brandy, in moderate quantity, often act in the same manner." These different effects of a cause apparently the same must, we presume, be attributed, in part, to the unequal sensibility of different patients to the operation of chloroform, and still more to their intolerance of pain, whether this depend upon constitutional peculiarities, and particularly upon a high nervous excitability, or upon casual physical conditions, such as rigidity of the os uteri or other soft parts of the mother, or upon an undue development, positive or relative, of the child's head. Another cause of the different reports upon this subject by obstetricians is undoubtedly the difference of the doses of the anæsthetic administered. effects of the same dose cannot be regarded as absolutely the same even for the same patient at different times, under different degrees of suffering, excitement, &c., and still less are they alike for different patients. But we believe it may safely be held that a moderate dose will promote, and a large one retard, uterine action, whenever the uterus itself retains its contractile power.

The influence of chloroform on the sequelæ of natural labor deserves to be considered in estimating the value of anæsthesia in obstetrics. It cannot be denied that of all pains the throes of childbirth are those from which recovery most speedily takes place. Nothing is more common among robust women of the laboring classes than for the strength to be but moderately impaired, even by a severe labor. This is met with habitually when the labor has been short, however severe it may have been, and frequently after a protracted and painful parturition. But in females more delicately organized, or whose luxurious habits of life have induced a morbid susceptibility of the nervous system, the restoration of strength and comfort is often extremely tedious Under such circumstances, the employment of an and uncertain. anæsthetic is frequently of signal service, for it palliates, even when it does not neutralize, the effects of pain, and protects the system from that "shock" which in surgery is justly accounted one of the most formidable elements of every severe operation.

Dr. Robert Lee ranks hemorrhage among the evil effects of chloroform in labor, and Mr. Steele makes a similar statement, but adduces only a single case in its support.2 Dr. Duncan and also Dr. Kidd advise that in cases where it is apprehended after an application of the forceps, the operation should be preceded by the administration of ergot, and Dr. Rigby, without, however, a direct reference to this accident, but rather with a view to obtain the aid of the abdominal muscles in the expulsion of the child, advises that the operation of the anæsthetic should be partially suspended while the fœtus is passing through the external parts of the mother.4 On the whole, we

¹ Chloroform and other Ansesthetics, p. 324.

² Liverpool Med.-Chir. Jour., No. III. p. 45.

⁴ Times and Gaz., Sept. 1858, p. 307.

^{*} Edinb. Med. Jour., ii. 803.

den. In a third instance, the patient obtained possession of about two ounces of chloroform, which she inhaled by herself, in the course of twelve hours. There appears to have been uterine inertia. At the expiration of the period mentioned, there was "a cold sweat, cold extremities, oppressed and wheezing respiration, receding pulse, and vacant glare." Consciousness was perfect. External and internal stimulants were employed, but without improvement. At this period instrumental delivery was resorted to, "and in ten minutes the anxious mother was a corpse." A very similar case to this is reported by Dr. Ramsbotham. Chloroform had been administered in the ordinary manner, the child was born, and the patient appeared comfortable. At the end of an hour and a half, however, distressing dyspnæa came on; this was followed by convulsions, and almost immediate death.2 An instance of the same description is recorded by Dr. Murphy, who maintains that in it, as well as the one last referred to, chloroform was foreign to the fatal result.3 Now, as dyspnœa was a prominent symptom in every instance, and one which does not characterize any accident of the puerperal state which could have existed in all of the three cases before us, we are constrained to see in them examples of one of the modes in which chloroform destroys life.

These illustrations would be sufficient to show that chloroform in parturient cases is not, as some of its foremost advocates would have us believe, almost, if not entirely, free from danger; "a most dangerous fallacy," as Dr. McClintock, of Dublin, remarks, "and one that would invariably lead to disastrous consequences, if generally acted on." But besides these fatal cases there are others which convey a serious, if not so solemn a warning. A woman in the Dublin Lyingin Hospital was in her first labor; the os uteri was unyielding, and there was much general irritability. For an hour chloroform was administered in very small quantities, which produced neither ansesthesia nor sleep. About a drachm of it was then poured upon a cupshaped sponge, which was reapplied to the patient's mouth. Hardly had she taken three or four inspirations when "a change came over her countenance; the eyeballs turned up, the pulse left the wrist, respiration was suspended, and some froth collected at the angles of the mouth." The sponge was instantly withdrawn, the circulation of fresh air promoted, the face and chest were aspersed with cold water, and ammonia was applied to the nostrils.4 The woman recovered, but every one will agree with Dr. McClintock that "had she been in nonprofessional hands, her life would have been lost." It cannot, moreover, be doubted that other cases of the same nature, in public, and still more in private, practice, have occurred without having been announced through the press.

Not, however, to conceal any fact which may influence the decision of the question of anæsthesia, in childbirth, it is proper to add one or two general statements in favor of its employment. Dr. Snow cites but one case in which it destroyed life, the first of those above referred

¹ Am. Jour. of Med. Sci., April, 1854, p. 552.

^{*} Obstetric Medicine and Surgery, p. 169.

⁴ Dublin Quart. Jour., Aug. 1855, p. 192.

⁸ Op. cit., p. 62.

in this article, the reader will be enabled to judge for himself how far, if at all, the denunciations of Dr. Lee and Mr. Johns are founded upon the results of experience, the sole permanent and reliable basis of opinion in such a case as the present.

In Various Diseases.—A case of continued fever is related in which, when the patient seemed exhausted by delirium and loss of sleep, the inhalation of chloroform was resorted to, and produced tranquillity and refreshing slumber, after which the disease took a favorable turn, and ended in recovery.

Several cases of tertian intermittent are reported by M. Délioux, in which a recurrence of the paroxysms was evidently prevented by chloroform, given internally by the mouth a short time before the period of their expected return.² Dr. Dalton, of Ohio, states that he has used it successfully to prevent the development of congestive intermittent fever, by administering one or two drachms in a little camphor-water, with half a grain of sulphate of morphia. "In quite a number of cases" of simple intermittent he found that it promptly arrested the disease.³

Wucherer has even recommended the inhalation of chloroform in pneumonia. According to him, it relieves the stitch in the side sooner than any other means, particularly if, in robust persons, and when the disease is extensive, venesection has been premised. The cough and oppression are immediately palliated. The inhalation should be employed three or four times a day, and eight or ten drops consumed on each occasion. The same physician used chloroform with advantage in whooping-cough and in several forms of bronchitis. Clemens not only confirms the preceding statements, but extends them. is of opinion that chloroform both palliates the cough and excitement, and directly favors the resolution of the extravasated fibrin, and prevents the deposit of more; so that it appears to stand in the stead of ordinary antiphlogistic remedies for the disease. Under its use the sputa retain their viscid and tenacious character throughout the attack. The pulse also loses in a remarkable degree its frequency and hardness. To produce such results, repeated inhalations are necessary—as often as from two to twelve times in twenty-four hours—and each time a drachm of chloroform is consumed in the course of fifteen or twenty minutes. In 1852 it was stated by Dr. Simpson that upwards of two hundred cases of pneumonia had been treated by Baumgärtner, Helbing, Schmidt, Varrentrapp, and others, with chloroform, and that the aggregate mortality was only 41 per cent. More recently Hutawa has also written favorably of its use in this disease.' It does not appear that in the class of diseases now under notice any great extension has been given to the practice recommended by the writers just quoted, nor is it likely to be generally adopted in pneumonia, at least if its administration demand such incessant attention as Dr. Clemens prescribes. Yet there can be no doubt that in various pulmonary affec-

Lancet, 1848, p. 119. Archives Gén., 4ème sér., xxiii. 51.

³ Phila. Med. Exam., Apr. 1856, p. 252.

⁴ Canstatt's Jahrb., 1849, p. 190. ⁵ Ibid., 1851, p. 99.

⁶ Month. Journal, Jan. 1852, p. 43. ⁷ Times and Gaz., May, 1855, p. 499.

case under the care of Grisolle was cured by opium, after chloroform had induced alarming insensibility; and two instances of a fatal issue are recorded by Dr. Snow, in spite of the administration of chloroform. But the one was a case of severe burn, and the other of sloughing of the integuments.2 This analysis, therefore, fully sustains the opinion above expressed of the value of chloroform in tetanus.

In chorea, the inhalation of chloroform serves as an auxiliary, at least, to other treatment. Its advantages, indeed, are marked, for in numerous cases in which other remedies were conjoined, the improvement began or became more rapid from the time when the chloroform was administered. It should be employed daily, and the patient kept under its influence for half an hour or more at a time. Evidences of its value have been published in England by Marsh, and in France

by Fuster, Géry, Bouvier, and Bouchard.

As might have been surmised, the trials made of chloroform inhalations in insanity do not lead to the conviction that they exert a curative power over the idiopathic form of this disease. As a palliative of excitement chloroform may nevertheless be advantageously employed in maniacal cases, and in the active forms of melancholia with a suicidal tendency. In some cases of hypochondriasis connected with gastric derangement its administration by the stomach is stated by Dr. Osborne to have done good. In puerperal mania it has been productive of more decided and permanent benefits, and occasionally of cure.

Delirium Tremens. The more active forms of this malady, those in which excitement and violence predominate, are said to offer the clearest indications for the use of chloroform. But it is also asserted to be useful in subduing delirious excitement, proceeding either from the primary or the secondary operation of slcohol. On examining the reports which have been published of cases in which this remedy was used, it becomes evident that large doses of opium or morphia were also administered; and although in some instances, when these remedies proved inoperative, chloroform inhalations appear to have produced a sleep which issued in recovery, yet it is no less evident that it also occasioned such a degree of narcotism or of syncope as appeared frequently to threaten, if it sometimes did not actually destroy, life. The action of the vapor of chloroform, when freely given, resembles too closely that of opium in excess to render it eligible in the treatment of a disease which is now well proven to be more certainly and safely cured by alcoholic stimulants.

Chloroform is probably more serviceable in this affection when it is administered by the stomach. It was originally employed by Dr. S. H. Pratt, of Baltimore, who gave it in drachm doses; first, in a case marked by exhaustion, debility, subsultus, and incoherence; and subsequently associated with Hoffmann's anodyne and tincture of valerian, in one of maniacal violence. In both it procured sleep, which ushered

1858, p. 449.

⁴ Ibid., p. 321.

² Op. cit., p. 335. ' Bull. de Thérap , liii. 46. ⁸ Bull. de Thérap., xlviii. 193.

⁶ Dublin Quart. Jour., Nov. 1853, p. 463. ° Ibid., xlix. 29. ⁷ Am. Jour. of Med. Sci., Oct. 1856, p. 368; Ibid., April, 1857, p. 317; Lancet, Oct.

much as possible the reflex excitability, to weaken the paroxysms, in order to diminish the dangers, and to gain time for entering upon a rational treatment. In this respect, we have observed results from chloroform narcotism which have surpassed all expectations. uræmic eclampsia, the chloroform narcotism is to be induced instantly when indications of an impending paroxysm show themselves—as great restlessness, increasing rigidity of the muscles of the arms, expiry of the interval between former paroxysms, fixity of expression, or tossing hither and thither. The narcotism is to be kept up until the premonitory symptoms of the paroxysm disappear, and quiet sleep follows; a result generally attained in one minute. But if it be not possible to cut short the paroxysm, then the chloroform inhalation is not to be kept up during the convulsive attacks and the comatose condition, in order to let an abundant supply of fresh atmospheric air reach the lungs. The chloroform inhalation moderates the imminently dangerous cramps of the muscles of the neck, epiglottis, and tongue, and may be continued even during a persistent trismus, when no medicines can be introduced into the stomach, and when loud mucous râles indicate the development of œdema of the lungs. sixteen cases of eclampsia occurring in succession, which I treated with chloroform and acids [benzoic, citric, or tartaric], complete recovery always took place." In the opinion of Dr. Channing, of Boston, since chloroform came into use eclampsia is as manageable a disease as any of the puerperal state, provided it be treated by inhalations of that agent alone, or combined with ether. Dr. Storer, also, expresses a high estimate of its efficacy, Macario found the attacks arrested by it in two cases,3 and accounts of its success in Australia have been published by Dr. Tracy. In fact, in almost every part of the civilized world a nearly unanimous verdict has been pronounced in its favor.

This remedy has proved itself scarcely less efficient in the treatment of infantile convulsions, which, it is well known, are generally excited by the irritation of undigested food, of the growing teeth, &c. The first, and one of the most interesting of the published cases of this nature occurred in the practice of Dr. Simpson. The patient was but ten days old when the convulsions began, and they continued to increase in severity in spite of various opiate and antispasmodic medicines, and external stimulants, until eighteen days had elapsed, when the strength failing, and laryngismus and dyspnæa occurring towards the end of each fit, chloroform was administered by inhalation. Immediately there was a suspension of the fits, which, however, returned when the anæsthetic was withdrawn. This was reapplied and administered so as to keep the patient asleep for thirty-six hours, with the exception of short intervals necessary for its nursing. No other convulsions occurred, and complete recovery took place. A case almost identical with this is reported by Mr. Williams, of Manchester. The

¹ Edinburgh Med. Jour., ii. 1123.

² Boston Med. and Surg Jour., March, 1857, p. 122.

³ Annuaire de Thérap., 1855, p. 49.

BRAITHWAITE'S Retrospect (Am. ed.), xxxviii. 227.

⁵ Edinb. Month. Jour., Jan. 1852, p. 40.

patient was ten days old, and was sixty hours under the influence of chloroform, during which time sixteen ounces of the liquid were consumed.' In convulsions from dentition the remedy has proved equally efficient, and that not only by inhalation as shown by the cases of Collins, Marotte, who used it by the stomach as well as in vapor, and Bowe, who gave it in the former manner only, in the case of a child seventeen months old, who had been subject to convulsive attacks from the age of five months. Dr. G. H. Fox reports a case of convulsions in a child of five years completely and promptly arrested by inhalations of chloroform. Administered in both manners, chloreform has been found successful as an antidote to the poisonous effects of strychnia.6 Like ether, it has sometimes been used with advantage to detect simulated diseases and in cases of hysterical rigidity and contraction of the joints. The agonizing pains of colica pictonum are generally relieved very promptly by chloroform taken in the form either of liquid or vapor; the same may be said of biliary and nephritic colic, dysmenorrhæa, spasmodic stricture, and indeed of all painful disorders whatever, but particularly of those in which pain constitutes the most urgent symptom. It is unnecessary to enter into any details regarding these, since the instances under the head of Ether might all be repeated here.

Topical Application.—Chloroform, when applied to the skin, exerts the double action of a counter-irritant and an anodyne; hence there is hardly any painful affection unconnected with inflammation that it is not adapted to remove or mitigate by its topical action. Neuralgia, muscular rheumatism, the pain of exostoses, nervous headache, and even articular rheumatism, are signally benefited by its use. In the last-named affection the vesicant action of the liquid is an obstacle to its frequent application, and has led to the employment by some physicians of "chloruretted hydrochloric ether," which, without irritating the skin, destroys its sensibility in a few minutes, and affects,

it is stated, even the subcutaneous parts.

Mr. Higginson reports having used chloroform with success as a local application to the perineum during its painful distension by the child's head in parturition, and to the sacrum with the effect of lessening the severity of the pains. He also applied this agent to the os uteri of a patient suffering from very severe dysmenorrhæa by means of a sponge placed in a curved glass speculum, which was introduced into the vagina. The pain almost immediately abated. Dr. Watson reports similar good effects in swelled testicle and spinal neuralgia, and also in preparing parts to which the actual or potential cautery, or the maxa, is to be applied, or in which an incision is to be made for opening an abscess."

```
Lancet, June, 1853, p. 535.

Bull. de Thérap., xlviii. 337.

Boston Med. and Surg. Jour., Feb. 1858, p. 456.

Am. Jour. of Med. Sci., April, 1850, p. 546; Times and Gaz., April, 1854, p. 316.

ARAN, Bull. de Thérap., xlii. 296; liv. 74.

LAROQUE, Bull. de Therap., xxxvi. 210.

ARAN, Arch. Gén. de Méd., 4ème sèr., xxv. 245.

Am. Jour. of Med. Sci., April, 1849, p. 528.
```

VOL. II.—9

Applied upon cotton to painful cavities in teeth, it almost immediately relieves the pain, and when rubbed upon the gum around a tooth, it materially lessens the suffering caused by the operation of extraction. To be most effectually employed in neuralgia, a few drops of chloroform should be poured upon a small disk of woollen cloth and applied over the superficial portions of the affected nerve, evaporation being prevented by covering the cloth with a piece of money. A mixture of chloroform and tincture of aconite is more efficacious than either agent alone. In this case the counter-irritant and anæsthetic properties of the liquid unite to afford relief. In mild neuralgic and non-inflammatory rheumatism, colic, tonsillitis, and spasmodic croup, pleurodynia, and lumbago, a mixture of chloroform and olive oil, to which camphor or ammonia may be added, forms a very efficacious liniment that may be employed for its gentle revulsive and ano-It may be used by friction or applied upon flannel or cotton wadding over the affected part. To children and delicate females this method is particularly adapted.

An ingenious and useful application of chloroform is that proposed by Dr. Hardy, of Dublin, who contrived an apparatus by means of which the vapor of this liquid can be thrown from a tube and directed upon the affected part. It was originally designed for relieving pain in diseases of the neck of the uterus, but was subsequently applied to the treatment of various local pains, in hæmorrhoids, irritable bladder, irritable wounds, anthrax, gout, rheumatism, and neuralgia. It has also been found efficient in relieving the buzzing in the ears which, in some cases of deafness, forms a very constant and distressing annoyance. As mertioned elsewhere, the vapor of sulphuric ether has been used for this purpose, and Marc d'Espine injected liquid ether into the middle ear. In 1854, Mr. Weatherford entirely relieved a case of this nature by the use of chloroform vapor applied to the auditory canal, and subsequently Dr. Bonnafont made use of a very simple but ingenious pump for throwing the vapor into the Eustachian tube. It is important to be remarked that in all of these cases of the local application of chloroform vapor its beneficial effects were not limited to its primary impression. In every case after this had subsided the pain returned in a mitigated degree, and generally by repeated applications of the anæsthetic was entirely removed.

The action of chloroform upon the cuticle singularly facilitates the absorption of medicines by the skin when they are applied in a solution of this liquid. The remarkable experiments of Dr. Waller upon this subject have been noticed in the Introduction.

ADMINISTRATION.—The importance of using only the purest chloroform is insisted upon by all writers on the use of this liquid for

⁷ Bull. de Thérap, xlviii. 185.

¹ Martin Solon, Bull. de Thérap., xl. 199; Morbau, Am. Jour. of Med. Sci., Jan. 1840, p. 187.

² Dublin Quart. Jour., Nov. 1853 p. 306.

RANKING'S Abstract, Am. ed., xxi. 120.

Archives Gén., 4ème sér., xxviii. 422.

Lancet. Dec. 1855, p. 201.

⁵ Times and Gaz., June, 1854, p. 618.

anæsthetic purposes. It should have a sp. gr. of 1.48. When pure, it does not, according to Mialhe, vesicate, but only reddens the skin or mucous membrane, but the addition to it of a little anhydrous alcohol renders it actively caustic. Hence the necessity of employing the purest only for inhalation. To ascertain its quality, a few drops of the suspected liquid should be allowed to fall into a test-glass half full of water, which retains its transparency if the chloroform is pure,

but becomes slightly opalescent if it contains alcohol.1

None but the most thoroughly washed chloroform should be used The difference between the effects of the pure and the for inhalation. impure vapor is very striking, as may be judged of from the following statement of Prof. Miller: "When impure, irritation seems to be produced in the air-passages; the patient coughs and is unwilling to inspire the vapor; when becoming stupid, muscular excitement is apt to be troublesome, and a tendency to talk may be very marked; after recovery there is sickness, probably vomiting, and the nausea is likely to prove of prolonged duration. Pure chloroform, on the contrary, does not irritate the air-passages, and is much less likely to cause vomiting; the patient breathes it readily, sometimes greedily, enjoying its fragrance and sweetness very much; muscular excitement does not always occur, and, when it does, proves both manageable and transient; the patient seldom speaks or attempts to do so before the stupor; this arrives speedily and is of a less apoplectic look; emergence is calm; and all disagreeable consequences are of rare occurrence."

There is much difference of opinion in regard to the proper mode of exhibiting chloroform, some insisting upon the necessity of a wellcontrived inhaler for the purpose, while the greater number prefer the simple method of using a handkerchief, sponge, or some analogous body upon which the requisite quantity of the liquid has been poured. The former method is advocated chiefly by Dr. Snow, whose experience and skill entitle his opinion upon this subject to peculiar weight. Dr S. indeed shows that in nearly all fatal cases of chlorofrom inhalation (37 out of 50) no instrument for the purpose was employed, and this fact would be decisive of the justness of his views were it not that an incomparably greater number of persons are subjected to the influence of chloroform without the inhaler than with The former category might therefore very well contain a greater number of fatal cases than the latter without the excess being chargeable to the mode of inhalation. Increasing familiarity, also, with the effects of chloroform and the habit of administering it appear to have augmented the preponderance of opinion in favor of the simpler method, which seems to be equally efficient with the other, quite as safe when skilfully applied, and free from the objection that exists to the use of any apparatus whatever that can be prudently dispensed with.

At a meeting of the French Academy of Medicine, held in July, 1857, this question was discussed, and, with a single exception, all the

^{&#}x27; Abeille Méd., v. 16.

Surgical Experience of Chloroform, p. 15.

surgeons present condemned the use of mechanical contrivances for the administration of chloroform vapor.1

In relation to the substance from which chloroform should be inhaled, general opinion appears to have settled down in favor of the simplest and most convenient, a handkerchief, sponge, or piece of carded cotton so shaped as to present a concavity capable of extending beyond the mouth and nostrils of the patient. A funnel-shaped sponge, sufficiently porous to permit the air to pass freely through it, is one of the most convenient respirators that can be used. sponge should be occasionally washed in alcohol and then in water to free it from the impurities that are apt to accumulate in its meshes. Experience has confirmed the general impression of physicians in the habit of using chloroform in their own practice, that the simplest mode of administering it is the best. Dr. Simpson now advises that a single layer of a towel or handkerchief should be laid over the patient's nose and mouth, and on this the chloroform should be poured drop by drop until complete anæsthesia is induced. To protect the lips and the adjacent skin from the irritant action of the liquid, these parts should be previously anointed.

The quantity of chloroform employed will depend upon the degree of anæsthesia sought to be induced, and the length of time it must be maintained. In severe surgical operations from one to four fluidrachms may be poured upon the inhaler at once, but for less serious occasions, and for ordinary cases of midwifery, in which it is sufficient to produce insensibility to pain without unconsciousness, a less quantity than that mentioned will suffice, after the primary inhalation. It is a great error to suppose that in natural labor, and for the performance of minor operations, it is always necessary to put the patients to sleep. As Dr. Rigby has remarked, "a patient may be kept quite sufficiently under the influence of chloroform, for any length of time, and yet be able to hear and answer questions, and thus we frequently hear a patient remark, 'I know I have a pain, and yet I do not feel it.'" Yet it is probable that such cases are not the most numerous. Towards the close of labor, when the pains are most severe, they can very seldom be neutralized without a state of unconsciousness being induced. The administration of the vapor can be commenced at any stage of labor, but except in cases of shorter duration than the average, it is not desirable to use it before the os uteri is fully dilated, and the expulsive pains have commenced. In those cases, however, in which the "grinding pains" which attend the first stage of labor are very severe, chloreform may be employed to palliate them. The application of the chloroform may be renewed as often as the natural state of the patient is about to return. According to Dr. Simpson, about an ounce of chloreform will in this manner be consumed in the course of an hour. The quantity administered during any one pain should never exceed a very few minims, but in the course of a protracted labor, from four to six ounces may sometimes be required; and in one case attended by Dr. Snow, seventeen fluidounces of chloroform were used with the inhaler,

¹ Bull. de l'Acad., xxii. 1088.

tained. The sign loses something of its value in hysterical persons in whom there is sometimes no winking on touching the eyelids, even when unconsciousness is scarcely induced.

A condition important to be noted is one approaching asphyxia, and produced by the chloroform having been inhaled more rapidly than it could be absorbed. The face grows livid, and the breathing is wholly suspended, or is abdominal only. The pulse is generally unaffected, and if care be taken to suspend the administration of the

vapor, respiration resumes its natural rhythm.

Minor operations in surgery, and most of those called for in obstetrical practice, require no higher degree of anæsthesia than the second. Ordinary labor may generally be rendered almost painless even by the first degree described. Dr. Simpson, however, recommends that at first a large dose of chloroform should be administered so as to bring the female at once completely under its influence, and to prevent excitement. If the uterine contractions are temporarily suspended by this method they soon return again. After the first full dose, a few inhalations before or with each returning uterine contraction are generally sufficient. The state of anæsthesia should be made deeper as the child's hand is passing the vulva.

The quantity of chloroform consumed in any one case may vary considerably, and if duly administered, may be very great without causing mischief. Stanelli states that in an operation on a very delicate female, she was kept under the influence of the vapor for nearly an hour and a half, during which time about two ounces of chloroform were consumed, and yet the patient experienced no bad symptoms either during the operation or afterwards. The same author refers also to cases in which patients were kept insensible for more than two hours without any bad consequences, and quotes one from Christison, of a female who during labor consumed no less than eight ounces of chloroform, and was under its influence for thirteen hours. A still larger quantity was administered by Dr. Snow in a case referred to above.

Antidotes.—There is no antidote, properly so called, to the poisonous effects of chloroform. When, therefore, the symptoms that betoken its dangerous effects present themselves, reliance must be placed almost exclusively upon measures which are in their nature adapted to restore the two declining or suspended functions, respiration and circulation. This may sometimes be accomplished by dashing a small quantity of cold water upon the face and chest, at intervals compressing the thorax so as to imitate the respiratory act, especially in the manner recommended by Dr. Marshall Hall, and known as "prone and postural respiration," and also by endeavoring directly to inflate the lungs. It has been suggested to employ oxygen for this purpose, but the suggestion is of no practical value. It is much better to force air into the lungs through the nostrils by means of a bellows, while the opposite nostril and the mouth are kept closed, and the larynx is pressed backward so as to obstruct the esophagus. But

Bull. de Thérap., xlv. 129.

artificial respiration is still better performed by the operator applying his own mouth over the patient's, while the precautions just pointed out are also observed. In this manner M. Ricord' saved several patients in whom life had become so nearly extinct that the pulse and respiration were both suspended. Dr. Snow correctly states that all the patients who are related to have been restored from a state of suspended animation, produced by an overdose of chloroform, were resuscitated by artificial respiration, and it was only by such means that he succeeded in recovering animals poisoned by the vapor of this liquid. But it is to be borne in mind that nearly all of the cases which afforded time for the successful application of this remedy, were cases of asphyxia, or of poisoning beginning at the lungs. When the primary action of chloroform manifests itself upon the heart, death is sudden or very rapid, and no time is afforded for the use of stimuli, internal and external, upon which, in the other cases of syncope, our chief dependence must be placed.

In addition to these means there have been recommended electrogalvanism, with which shocks should be transmitted through the chest, friction and warm stimulating applications to the extremities, caustic ammonia, or, what is better, boiling water applied to the skin in a tumbler covered with a towel, and inverted upon the breast of the patient. These expedients have all succeeded in preventing death when it appeared to be inevitable. Of a portion, and even of the most efficient of them, it has been very judiciously remarked by Mr. Nunneley, that some will be disposed to regard them as very paltry and meagre, and not of a very energetic or hopeful character. But it is far better to employ such as may do little good, than to have recourse to those which may do a great deal of harm, and to know how far our knowledge and power really extend, than to cloak ourselves in ignorant and meddlesome officiousness, lest our incapacity should be revealed.

SPIRITUS ÆTHERIS NITROSI.—SPIRIT OF NITROUS ETHER; SWEET SPIRIT OF NITRE.

DESCRIPTION.—The officinal spirit of nitrous ether is formed by the mutual reactions of potassa, nitric acid, and alcohol. It is a clear liquid of sp. gr. 0.837, of a pale yellow color, a fragrant ethereal smell resembling that of ripe apples, and a burning, aromatic, sweetish-acid-ulous taste; it is very volatile, and by evaporation on the skin produces a decided sense of coolness; it is also very inflammable, and burns with a whitish flame; it mixes readily with water and alcohol, and grows acid by keeping. In commerce it is very apt to be adulterated so as to be rendered utterly worthless as a medicine.

ACTION. On Man.—Christison relates the case of a female, in whose chamber a three-gallon jar of sweet spirit of nitre was broken. She was found quite dead, lying like one in a deep sleep. On dissection of her body, the lungs were found much congested. Kraus speaks of

¹ Bull. de Thérap., xxxvii. 394.

a boy, twelve years old, who, after taking a drachm of this liquid, was attacked with violent colic and a copious discharge of thin mucus, an effect which may probably be ascribed to the free acid contained in the medicine. According to Flourens, it causes, when inhaled, much

more unpleasant and serious symptoms than ether.

Uses.—Although commonly employed for other purposes, spirit of nitrous ether is regarded by some authorities as a powerful stimulant and antispasmodic. Richter states that in relieving hysterical spasms it is often more effectual than ether itself, and recommends it to be given in low forms of fever, as tending to sustain the strength, and, at the same time, to favor cutaneous transpiration. Nothing equals it as a diaphoretic in slight and ephemeral febrile affections; and even in those which depend upon inflammation its sedative and tranquillizing operation renders it one of the most valuable of the minor medicines. Its diuretic properties are perhaps more generally acknowledged; for there is no form of dropsy in which it is not employed in conjunction with other and more active medicines. Dr. Christison thinks it is least serviceable in dropsy connected with diseased kidney, and most useful in the form associated with diseased heart. This opinion is perhaps correct as regards chronic dropsies of the first class mentioned, but in that form of general dropsy which follows scarlatina, the medicine is eminently serviceable, as well as in general anasarca produced by suppression of the perspiration. In these cases it is advisable to combine with it squill, the acetate or bicarbonate of potassa, digitalis, or, as Richter advises, the infusion of calamus and juniper. It is commonly employed to relieve the strangury occasioned by cantharides, to moderate the irritant action of copaiba, to palliate gravel and all diseases of the urinary organs in which it is desirable to lessen the acrimony of the urine, or, by increasing the quantity of this secretion, to diminish the chances of calculous deposit. It may be advantageously employed in conjunction with aromatic spirit of ammonia, or with carminative infusions, for relieving flatulent distension of the stomach, or the nausea produced by indigestion.

ADMINISTRATION AND DOSE.—The dose of sweet spirit of nitre as a diaphoretic is from ten to thirty drops, or twenty minims, repeated every hour or two, either alone or in some warm infusion. To obtain its diuretic virtues, from half a fluidrachm to one fluidrachm should be given in some appropriate vehicle. The last-named quantity con-

tains about one hundred drops.

CUPRUM AMMONIATUM.—AMMONIATED COPPER.

DESCRIPTION.—This preparation is made by rubbing together half a troyounce of sulphate of copper and three hundred and sixty grains of carbonate of ammonia until effervescence ceases, and drying the product with bibulous paper and a gentle heat. The moisture developed by this process is derived from the water of crystallization of the sulphate of copper, but the precise reaction which ensues is not accurately determined. It is, however, presumed that the sulphate of

begins to produce nausea. It may be given in the form of pill made with bread-crumb or confection of roses, and only when the stomach contains food.

ZINCI OXIDUM.—Oxide of Zinc.

DESCRIPTION.—Oxide or protoxide of zinc is prepared by depriving the precipitated carbonate of zinc of carbonic acid by exposing it to a low red heat. It is a yellowish-white powder, without smell or taste, is insoluble in water, but dissolves in acids and in caustic solutions of the alkalies.

Unguentum Zinci Oxidi.—OINTMENT OF OXIDE OF ZINC.

This ointment is prepared by mixing eighty grains of oxide of zinc

with a troyounce of lard.

HISTORY.—This substance was originally prepared by sublimation, on exposing metallic zinc to an intense and continued heat. It was introduced into medicine by Paracelsus, and the first physician who employed it in epilepsy was Gaubius, who learned its antispasmodic

virtues from a charlatan, Ludemann by name.

ACTION.—The imperfect experiments of Heller led him to conclude that oxide of zinc does not undergo solution in the intestinal canal, but is entirely discharged with the fæces; but Schlossberger detected it in the urine, and demonstrated its solubility in liquids such as usually exist in the stomach, and Michaelis proved by experiments upon animals that it is thus soluble, and is consequently absorbed.3 He found it in the venous blood, but not in the chyle, and observed that it is so slowly eliminated that, even when administered in large doses, it cannot be detected in the bile or urine for four or five days. It appears in the former of these secretions first. When administered to rabbits in large doses, it acts as an irritant of the stomach, producing erosion and ulceration; and, if long continued, a gradual wasting of the flesh. The author last named cites the experiments of Werneck, who administered oxide of zinc to fifteen healthy persons and to himself, in doses of four grains and upwards, occasioning eructations, nausea, confusion of the mind and senses, heat in the epigastrium, vomiting, thirst, fever, a jerking pulse, muscular spasms, &c. He also refers to the case of an epileptic patient, who, after having taken 3,246 grains of oxide of zinc, fell into a state of marasmus, with cedema of the extremities, and was only rescued from death by abandoning the medicine. His epileptic attacks were in no degree improved. Similar effects had earlier been described by Richter, and Delasiauve states that he had often been obliged to suspend its use on account of the obstinate diarrhoea it produced, or the invincible disgust it inspired. Yet effects of this kind cannot be of ordinary occurrence, for we find that Home' sometimes gave as much as forty grains a day without

¹ RICHTER, Ausfür. Arzneim., iv. 505.

³ Ibid., x. 109.

⁶ Clinical Experiments, p. 220.

Arch. f. phys. Heil., vii. 589.

⁴ Traité de l'Epilepsie, 1854, p. 375.

the numerous experiments of Dr. Radcliffe and Dr. Marcet in London,¹ and Dr. Sieveking speaks slightingly of the medicine. Oxide of zinc, therefore, can scarcely claim an exemption from the sentence of condemnation which rests upon all the specifics for epilepsy which have hitherto been proposed. It may be no worse, but it is not better, than the rest.

This medicine has been recommended in the treatment of chorea by a great number of physicians, including Hufeland, Borsieri, Gaubius, Duncan, Alexander, Wright, Bedingfield, and Crawford. Mr. Bedingfield states that the remedy was so speedily and decidedly successful in the Bristol Infirmary, that he could not help regarding it as a specific. Upwards of forty cases occurring there were, with one exception, cured by it. Crawford also found it of the most uniform efficacy. Several cases reported by Dr. Barth, of Sierentz, and regarded by him as chorea, but which were rather instances of irregular convulsions, appear to have been cured chiefly by this medicine. Unlike epilepsy, chorea tends spontaneously to a cure, and unless the influence of a medicine upon it is very prompt and decided, its therapeutic value is difficult to determine. In the present case sufficient details have not been furnished to enable us to form a rational opinion upon this point.

Dr. Marcet has found great advantage from the use of oxide of zinc in chronic alcoholism, attended with want of sleep, trembling, vertigo, tinnitus aurium; muscæ volitantes, and occasional hallucinations. The cure was often effected by administering the medicine in doses of two grains twice a day after meals, if given in pill or powder, but in fractional doses if dissolved in carbonic acid water, which is said to be preferable. The dose should be gradually increased to two or three times the quantities mentioned. Dr. M. thinks he has detected a narcotic property in oxide of zinc.

Oxide of zinc is also reported to have cured whooping-cough, spasmodic asthma, intermittent fever, and chronic dysentery, but the instances of its alleged efficacy are too few to inspire any confidence in its use in these affections.

Dr. Theophilus Thompson states that the night-sweats of phthisis are more certainly controlled by this medicine than by any other with which he is conversant. He prescribed it in conjunction with extract of conium or of hyoscyamus. This statement has been confirmed by the reports of Drs. J. B. S. Jackson, Coale, and Abbott, of Boston, the last-named of whom has published an abstract of twenty-three cases illustrating the efficacy of the treatment, and from which it appears that he usually prescribed four grains of the oxide with three of extract of conium. Dr. Jackson gave the former medicine alone, and in doses of seven or more grains, and also found it useful in cases of profuse perspiration unconnected with consumption of the lungs.

Externally oxide of zinc is employed in powder, and in an ointment (Unguentum Zinci Oxidi) as a protective, astringent, and mildly stimu-

RANKING'S Abstract (Am. ed.), xxvii. 63.

² CANSTATT, Mod. Klinik, iii. 344. Cycl. of Pract. Med., i. 411.

Bull. de Thérap., xlviii. 169.
 Lancet, Aug. 1854, p. 97.
 Times and Gaz., 1859 and 1862.
 Bost. Med. and Surg. Jour., lvi. 249, 294.

ground appearing to give way beneath the feet, and which has been aptly compared to the sensation experienced in a ship rolling at sea. It may be conjectured to depend upon an irregular action of the vasomotor nerves of the brain. When this condition exists without any notable alteration of the blood, or any other appreciable cause, the author we have named asserts that valerianate of zinc is its most certain remedy. He prescribes it in doses of one or two grains three times a day, associated with extract of valerian. Dr. Neligan affirms valerianate of zinc to be very useful in the ordinary convulsive affections of children and young persons of either sex. Dr. Harley has reported the case of an hysterical girl of fourteen, who was apparently cured by this medicine of a violent and incessant nervous cough. It is also alleged to have cured epilepsy and chorea.

ADMINISTRATION.—Valerianate of zinc may be given in the dose of one grain two or three times a day, in pill made with mucilage or conserve of roses, or in some sweetened aromatic water, such as orange-flower water. In preparing the solution, the salt should first be triturated with a small quantity of water.

Bull. de Thér., liii. 49.

CLASS VII.

SPINANTS. (TETANICA.)

It was stated in the introductory remarks to the Class of Cerebro-Spinal Stimulants that certain medicines act "exclusively upon the spinal marrow." These have been arranged in a separate Class, under the title *Tetanica*, and are also designated by the barbarous vernacular term *Spinants*. They are few in number. Indeed, strychnia is the only substance which operates as a stimulant of the whole spinal nervous system. Ergot and borax, in virtue of their special influence upon the uterine muscles, are held to be stimulants of a limited portion of the spinal marrow, and to belong, therefore, to the present class of medicines; but their special application in therapeutics renders their position more appropriate elsewhere, the one with Emmena-

gogues and the other with Irritants.

The spinal marrow is the organ upon which the power of muscular motion appears directly or indirectly to depend, but, apart from the brain, it does not give rise to motion in any determinate direction. The brain, as the organ of perception and of will, controls the mode of muscular action. It does so evidently in regard to all the movements which bring the individual in relation to external things, and, by education and the power of the will, it becomes capable of controlling, to some extent at least, the contraction of muscles usually described as involuntary. There is, consequently, some reason to doubt the correctness of the ordinary division of the nerves into voluntary and involuntary. Again, causes which impair the nutrition of the whole body necessarily impair the muscular system, as well that part which is removed from the ordinary influence of the will, and which is usually called organic, as that which the will habitually controls and which is described as the muscular system of animal life, of the life of relation, &c. A study of the examples furnished by experience of the loss of muscular power shows that this may be owing to some defect either in the nervous organs themselves, or in the muscular system. If the muscles of a limb are wasted by mechanical pressure, the limb cannot move as in health, however perfect the power of the nervous system may be; and, on the other hand, the muscles may retain their due development, and yet be motionless, if the nervous centres cease to generate power, and in sufficient

amount. But the cessation or diminution of the generation of nervous power may depend either upon temporary and removable causes not affecting the organic constitution of the nerve centres, in which this power is generated, or upon a physical deterioration, or even a disorganization of the nerve centres or trunks. In the latter case, there is no remedy; in the former, the cure will depend upon our power of promoting the nutrition of the muscles, or of stimulating the nervous centres, to increased activity. We have seen elsewhere how potent electricity is in quickening muscular nutrition and developing nervous power; and, were it not that this agent appears to act directly upon nutrition, as well as upon the nerves, it might with great propriety be classed along with the one we are about to examine more particularly.

Medicines capable of producing tonic spasm must be regarded as excitants of those nervous centres upon which the provoked movements depend. Such as appear to act as special stimulants of the gravid uterus probably limit their operation on the spinal axis to its lower portion; but strychnia plainly stimulates the entire centre of muscular motion. It is to strychnia, therefore, we may have recourse in all cases of loss of muscular power in the organs of nutrition, or those of relation and locomotion, provided that the paralysis depends upon some other cause than a compression or destruction of the substance of a nervous centre or trunk. But as the phenomena are by no means determinate which denote the former of these lesions, the mere suspicion of its existence, however well supported, except by permanent muscular contraction and rigidity of the paralyzed part, should not induce us to abstain from a cautious exhibition of the appropriate remedy.

NUX VOMICA.

DESCRIPTION.—Nux vomica, and its active principle strychnia, are the products of Strychnos Nux vomica, a tree belonging to the natural family Apocynaceæ, which is quite common on the Coromandel Coast, the island of Ceylon, and the neighboring countries. It is of moderate size, and has a thick trunk with a grayish mottled bark, covered in parts with a reddish-brown efflorescence. The leaves are oval, shining, and leathery; the flowers greenish-white, and arranged in small, terminal corymbs. The fruit is ovoid, orange colored, one celled, pulpy, about the size of an apple, and containing many seeds.

The seed or bean, which is the officinal portion, is about an inch in diameter and two lines in thickness, somewhat depressed on one side and slightly convex on the other, or button shaped; of a greenish-gray color, and a silky, lustrous surface, owing to the fine close hairs which are set obliquely upon it and extend slightly beyond the edge. It is extremely hard, and is pulverized with great difficulty. Internally, "it consists of a horny, whitish, or yellowish albumen, which separates into two parts, and contains in a small cavity in the circumference the embryo with its two acuminate cotyledons." The seeds are inodorous, but their taste is intensely bitter and acrid.

The powers of nux vomica depend upon two alkaloids, strychnia

Although two or three scattered examples of death from its use may be found related by Matthiolus and by Hoffmann, its real qualities were certainly unknown until in recent times the more general use of the drug, and especially of its active principles, have rendered its poisonous effects unhappily familiar to every physician. Alston gives a full account of the subject.

ACTION. On Plants.—The experiments of Marcet prove that a solution of five grains of the extract of nux vomica in an ounce of water, caused a plant (*Phaseolus vulgaris*) to die within twelve hours. Bouchardat found that water containing 12¹00 part of muriate of

strychnia or brucia, was sufficient to kill a plant in five days.

On Animals.—It acts poisonously upon all, but in different degrees. Desportes gave a hen nux vomica in gradually increasing doses until she took nearly two and a half drachms a day. Ruminating animals appear to be less easily affected by it than other quadrupeds. Fishes placed in water containing the 10,000 part of muriate of strychnia, die within ten minutes. Flies die in convulsions, and intestinal worms are destroyed by this preparation.

The writers quoted by Murray say that the rapidity of the operation of nux vomica varies. If given to dogs, they pant in breathing, seem alarmed, and if forced to rise, their limbs are rigid. Tetanic spasms ensue, and, with short intermissions, recur until death. During the spasms, according to these early experimenters, the animals appear to be insensible to all impressions, so that even their ears or

tails may be cut off without eliciting signs of pain.1

More modern observers have conducted experiments with nux vomica and its preparations under extremely various conditions, but their results have been singularly uniform, and may be described as follows: By whatever avenue introduced into the system the effects are essentially the same, but are more or less marked according to the absorbent power of the surface to which the poison is applied. Hence the phenomena are developed most rapidly when it is injected into the veins. These phenomena consist of paroxysms of tetanic convulsions, from one to seven minutes in duration, and with like intervals of repose between them. After a more or less frequent repetition of these, and according to their severity, death sometimes takes place by asphyxia produced by a tonic spasm of the respiratory muscles. After death, in these cases, no other lesion is found than congestion of all the internal organs, as in other cases of asphyxia. Some experimenters have added to this cause of death tetanic spasm, or, more probably, exhaustion of the heart, for it is found that this organ after death has lost its irritability. The experiments of Mr. Harley are regarded by him as proving that death from strychnia may occur independently, 1st, of exhaustion; 2d, of asphyxia from closure of the glottis; and 3d, of suffocation from spasms affecting the respiratory muscles; and that it does probably occur because strychnia destroys the power of the tissues and fluids of the body to absorb oxygen and exhale car-

³ Lancet, June, 1856, p. 648.

¹ Apparat. Medicam, i. 707.

^{*} Galtier, Toxicologie, ii. 258; Balydon, Lancet, July, 1856, p. 72.

and heaviness in the limbs, and stiffness of the joints and muscles, particularly those of the chest and lower jaw, and these are succeeded by spasmodic symptoms. When the dose has been large, or the conditions favorable to its rapid absorption, the first phenomena are clonic spasms, or violent muscular twitches, which, with the accompanying sensation, have been compared to the effects of an electric shock. These phenomena are succeeded by thoroughly tetanic spasms of all the muscles, during which the limbs are rigidly flexed or extended, the lower jaw firmly fixed against the upper, and the body arched as in opisthotonos. The rigid contraction of the respiratory muscles renders breathing laborious, or even temporarily suspends it altogether, and, as a consequence of this immobility of the chest, a stasis of blood takes place in all superficial veins, giving a livid color to the skin. The retracted corners of the mouth disclosing the set teeth, the foam issuing from between them, the staring eyes and the contracted brow, lend to the countenance an expression of anguish mingled with affright. Amidst this horrible array of symptoms the mind remains unaffected, and it is even probable that little pain is experienced. The convulsions may continue without intermission until death, but more generally they are interrupted by intervals of calm, or rather of exhaustion. At this time, however, the slightest stimulus, a breath of air, a sudden noise, or the lightest touch, may act with the suddenness of an electric shock to renew them. As they succeed one another, the violence of the muscular contractions may diminish, but not so the disorder of the circulation and the exhaustion of the nervous force; these augment continually, the congested state of the bloodvessels grows more and more decided, and in the intervals between the fits the prostration is more complete. Finally, the patient dies either from asphyxia or from asthenia, according to whether his death occurs during the paroxysms or during their suspension.

The peculiar symptoms of strychnism once developed tend rapidly to a fatal termination, and generally within an hour or two at most. A few minutes only have in some cases elapsed between swallowing the poison and death. When, however, from the rejection of a portion of the poison, or from other causes, a fatal issue is escaped, the patient always complains of extreme fatigue and exhaustion, and sometimes of muscular stiffness and neuralgic pains, which may last for several

days.

The smallest quantity of nux vomica which is known to have caused death is said to have been three grains of the alcoholic extract. Of strychnia, the least dose which is recorded as having proved fatal appears to be one grain. Recovery occasionally takes place after very large doses, such as three or even four grains of strychnia. This quantity has not unfrequently been taken without fatal results when it was reached by gradual increase from a fractional dose. Dr. S. S. Harris reports two cases of recovery after a dose of from six to eight

² Wharton and Stillé, Med. Jurisp., p. 516.

¹ A full account of the poisonous effects of strychnia is given by Husemann in Jour. f. Pharmacodynamik, &c., i. 469.

remedy in central paralysis was still more emphatically reiterated by Lallemand in 1820,¹ and as other physicians met with cases of the sort in which it was manifestly injurious, there arose a general indisposition to employ it. Still later, however, as its special appropriateness to the treatment of other paralytic disorders became developed, the medicine has gradually regained the confidence of the profession. Yet it need not be entirely excluded from the therapeutics of even central paralysis, provided that its use be restricted to cases in which the symptoms have long been stationary and there is no excitement. Although a cure may not be expected from it, still, if employed with circumspection, it is capable of carrying improvement to its farthest limit. But the utmost caution should be observed, and the progress of the medicinal influence so closely watched as to restrain its action within the bounds of safety.*

The cases to which it was originally applied continue to be those in which it renders the greatest service, those, namely, of impaired innervation. Whether in these the paralysis be limited to the tongue or the muscles of one eye, or whether it occupy the greater part of the voluntary muscles, this remedy affords a better prospect of relief than

perhaps any other.

The experiments and observations of Dr. Brown-Séquard confirm in the fullest manner the conclusions of experience, that strychnia is a remedy for those forms of paralysis only in which the spinal nervous centre requires stimulation, including all which are now known as reflex paralysis, and those which depend upon general exhaustion, or any other cause by which the spinal marrow is deprived of its due

supply of blood.

The administration of strychnia in paralytic affections should be very cautiously conducted. Beginning with one-twentieth, or from that to one-twelfth of a grain daily, the dose may be gradually increased until some jerking or tension is felt in the paralyzed muscles. At this point the remedy may be suspended, or its quantity diminished. Strychnia has been applied to the denuded cutis, but in this manner it causes severe pain, and is very apt to excite an erythematous inflammation of the adjacent skin; besides which its effects are uncertain. By the hypodermic method its operation is rendered more certain and prompt. It has also been used in frictions to the sound skin by means of an ointment, so that about one grain of strychnia, or of its sulphate shall be daily applied. The skin subjected to these frictions should be kept carefully clean by means of soap and water. The paralyzed muscles may be covered with fomentations containing tincture of nux vomica, while strychnia is given internally.

Amaurosis.—Strychnia was employed in this disease at an early date, by Dr. Middlemore, of Birmingham, and also by Shortt, Liston, Guthrie, &c. The physician first named confined its use to those

Diseases of the Eye, ii. 282.

Recherches, p. 267.

² An interesting essay on this subject by Bufalini is contained in Dublin Quart. Jour., May, 1856, p. 492.

^{*} Sandras, Mal. Nerv., ii. 84. TROUSSEAU, Thérap., 5ème éd., i. 783.

cases in which the retina is in a state of atony from some cause acting directly upon its texture through the medium of general debility of the system. He thought it peculiarly applicable when the loss of vision was due to using the eyes by a very feeble light, as in the case of miners. He found but slight advantages comparatively from its internal use, but preferred its endermic application to a blistered surface above the eyebrow. He commenced with the daily application of a quarter of a grain, and gradually increased this quantity to two grains, keeping the blister open meanwhile by a dressing of savine cerate, and tempering the pain by mixing the medicine with a little flour or powdered opium. Under similar conditions, Petrequin cured several cases.1 Miquel and Verlegh employed strychnia successfully by friction or inoculation around the orbit. Werber cured diplopia and amaurosis from deranged innervation by the endermic method, and also by dropping into the eye a solution of strychnia, of one grain to half an ounce of water.3 Griffin was equally successful in a case apparently of congestive amaurosis. After the failure of evacuant and depletory measures, one-twelfth of a grain of strychnia was at first given once and afterwards twice a day, until in the course of eight weeks as many grains had been taken. At the end of this period the cure was complete. Sandras, who speaks highly of the use of strychnia in the form of amaurosis now described, advises that the vesication near to the eye should be made with strong ammonia mixed with lard, that it should be of small extent, and not renewed immediately upon the spot first occupied, lest a troublesome sore and an unsightly scar should result. The strychnia itself may be incorporated with the portion of lard or cerate which is used as a dressing for the blister. Two cases of chronic amaurosis cured by the internal administration of strychnia are reported by Dr. Griffin. An interesting account is given by Mr. de Ricci, of Ballymahon, of an epidemic night blindness which prevailed in the work-house of that place, some cases of which were peculiarly intractable, and were only cured by the internal or the endermic application of the medicine.

In prolapsus of the rectum Schwartz used the extract of nux vomica with great advantage, both for children and adults. For the former, he dissolved two grains in two drachms of water, and of this solution gave two or three drops to infants, and from six to fifteen drops to older children. Duchaussoy used strychnia with perfect success in a case of four years' standing. Mr. A. Johnson also effected a cure by applying one-sixteenth of a grain of strychnia upon a blistered surface over the coccyx. Koch, of Stuttgart, was equally successful in a case of fifteen years' duration, by means of injections of cold water containing twelve drops of the tincture of nux vomica. Foucher and Dolbeau found that ten or fifteen drops of a solution of strychnia, containing one part of the alkaloid to one thousand of water, and in-

¹ Bull. de. Thérap., xv. 28, 286.

⁸ Op. cit., p. 136.

⁶ Op. cit., p. 249.

⁷ Ibid., Feb. 1858, p. 46.

Arch. Gén., 5ème sér., ii. 327.

² Ibid., xxxiii. 350.

⁴ Dublin Quart. Jour., Aug. 1853.

Dublin Quart. Jour., Nov. 1858, p. 315.

⁸ Bull. de Thérap., xi. 31.

jected beneath the skin about a quarter of a inch from the margin of the anus, produced an immediate amendment in the affection, and in

some instances the cure was perfected by a single operation.1

When incontinence of urine, or, on the other hand, retention of urine depends upon impaired power in the muscular coat of the bladder from habitual distension, or from pressure by the uterus, the operation of strychnia is generally very efficient. The remedy appears to have been first proposed by Cerchiari, of Bologna, in cases occurring after parturition. Cory relates an instance of the sort in which the bladder regained its power after the second dose of one-sixteenth of a grain.2 Solly employed it successfully in a case of incontinence of urine after lithotomy,3 and Lecluyse, in retention of urine and consequent paralysis of the bladder, by injecting a solution of strychnia into this organ. In that troublesome form of incontinence of urine which so commonly affects children. Mondière found the alcoholic extract of nux vomica better than all the other remedies he had employed, and, indeed, his experience coincides with that of Ribes, Guersent, Mauricet, and others. Trousseau, however, thinks belladonna superior.

The writer last mentioned has treated sexual impotence successfully with strychnia. He was induced to employ it by observing its effects in the case of a man affected with paraplegia for three years, during all of which time the genital organs had lost their power. Under the use of the medicine their function, along with that of the muscles of the extremities, was re-established. Similar effects were noted in a second case of the like description, and also in a third, where the want of power appears to have been limited to the penis, and where, also, it was only remedied while the medicine was actually in use. Magendie, and also Duclos, found it serviceable under like circumstances. The latter used the alcoholic extract in doses of a grain daily, and gradually increased until eight were taken in a day. He found that it not only cured the sexual impotency, but also improved the digestion when the appetite was feeble, or the food occasioned gas-

tric pain.

The diseases characterized by excessive, or rather disordered, action, in which strychnia has been employed with benefit, are more numerous than those which have been noticed. Even in tetanus its power has been unequivocally displayed. In 1847, Dr. Fell, of New York, published seven cases of tetanus, six of which were certainly of the traumatic variety, and which all recovered under its use. His plan of administering it was to give $\frac{1}{8}$ or $\frac{1}{10}$ of a grain, and in two hours $\frac{1}{10}$ gr., then reducing the dose still further, and only to the extent of producing specific signs of its influence after each one. Dr. Kollock, also, relates a case of traumatic tetanus occurring in a negro girl,

Bull. de Thérap., lx. 548. Lond. Med. Gaz., xxiii. 905.

³ Ibid., Feb. 1849.

⁴ Month. Journ. of Med. Sci., Aug. 1850, p. 176.

Dierbach, Neueste Entdeckungen, ii. 532.
 Thérapeutique, 5ème éd., i. 783.
 New York Jour. of Med., vii. 371.

ceased altogether, but the hysterical symptoms proper were unaffected.1

Kroyher, of Presburg, announced, some years ago, that minute doses of the tincture of nux vomica in aromatic water, or cherry-laurel water, formed a specific for the sympathetic vomiting of pregnancy. In many cases it proved successful within a week, or even less time. Mr. Gream used the tincture with the best effects in hay fever. He gave from ten to twenty drops, three times a day. The external use of equal parts of tincture of nux vomica and soap liniment is strongly recommended by Kissel in the local forms of chronic rheumatism.

Relants, of Rotterdam, has furnished a favorable account of the treatment of facial neuralgia by nux vomica. Twenty-five out of twenty-nine cases were cured, and three of the remaining four were still under treatment. Old as well as recent cases yielded to the medicine with singular rapidity.4 Tincture of nux vomica was recommended by Serres in lead colic, to be given in doses of from ten to thirty drops, according to the course of the disease, and also to be administered in clysters, and applied to the abdomen on cataplasms. Dr. Huss, of Stockholm, and Dr. Neligan, of Dublin, found it equally successful. More recently (1854), Dr. Swett, and also Dr. Bulkley, of New York, spoke favorably of its effects. They found that it generally procured relief within forty-eight hours, the bowels acting and the pain subsiding. In painful menstruation, independent of blood disease, and of organic uterine affections, and in prolonged after pains, it has been strongly commended by Rademacher. He directs the tincture of nux vomica to be associated with tincture of castor in equal parts, and thirty drops of the mixture to be given five or six times a day.

Murray refers to several writers who have recommended nux vomica in intermittent fever, and Vogt' thinks that it has been wrongly neglected. He advised that it should be associated as a tonic with the true antiperiodic medicines.

There are several forms of dyspepsia in which this medicine is extremely useful. The one in which it first was employed was described by Rowland (1838), and is true gastralgia, a disease in which paroxysmal pains of various characters, but always intensely severe, are felt in the stomach, and radiate thence to the chest, hypochondria, and back. As the fit subsides, a copious eructation of gas, and of an insipid or acid liquid, takes place. Yet digestion and nutrition are unimpaired, and the bowels are much confined. Rowland gave a quarter of a grain of the watery extract of nux vomica three or four times a day. In other cases the stomach is habitually irritable, and the general aspect of the patient indicates an anemic condition. In these cases, however, the gastric irritability is such that the preparations of iron are not tolerated, and then, as Clarus has shown, the extract of nux vomica renders the stomach capable of supporting

Abeille Méd., ix. 286.

^{*} Lancet, June 8, 1850.

⁶ Lancette Française, Dec. 1830.

⁷ Pharmakodynamik, i. 140.

² Med.-Chir. Rev., Jan. 1841, p. 231.

⁴ Archives Gén. de Méd., 4ème ser., iii. 92.

Bull. de Thérap., xlix., 557.

and only yielded to the administration of strychnia in the dose of one-twelfth of a grain, three times a day. Homolle is stated not only to have removed, by its means, impacted fæces, but actually to have relieved strangulated hernia, when the necessity of an operation seemed to be inevitable. A similar example of the apparent efficacy of

strychnia in this affection is reported by M. Lopez.3

The tonic influence of this medicine upon the bowels is further shown by its efficacy in some forms of dysentery. In the last century Hagström employed powdered nux vomica in scruple doses, and in hundreds of instances with wonderful success. And Murray, from whom this statement is derived, refers to other confirmatory cases.4 Hufeland also resorted to it with the happiest results in an epidemic of dysentery at Jena in 1795. He prescribed rather less than a grain of the extract every two hours. Rademacher found it necessary to give opium also in some cases. Mr. Vaux, of Ipswich, England, gave as much as seven grains of nux vomica three times a day, and reported his success as remarkably uniform. Frisch prescribed it with advantage in subacute dysentery, and Recamier in chronic diarrhea, as did also Nevins when the latter disease affected young persons.⁶ In 1830 Dr. Bardsley published six cases illustrating the curative powers of strychnia in this disorder occurring in persons somewhat advanced in life and of feeble constitution, and very plausibly conjectured that it acts by restoring the tone of the affected parts. He prescribed the medicine in pilular form, and in the dose of one-sixth of a grain three times a day.7

Sulphate of strychnia has been used by M. Sée in the treatment of epidemic cholera. The cases in which this physician prescribed it were forty-seven in number, and their results are certainly not such as to encourage a repetition of the trial. According to M. Sée, the advantages of the remedy are that in moderately severe cases it controls the discharges, without producing, like opium and other stimulants, a subsequent violent reaction. But this result is obtained equally well, if not better, by the administration of acetate of lead.

Nux vomica was long ago recommended (Murray) as a remedy for lumbrici, and it is said to be commonly used, associated with drastics, by the inhabitants of the Dutch province of Overyssel to expel the tape-worm. This is quite likely to be true, as all bitter medicines are more or less vermifuge, and this one, in addition, gives unnatural

energy to the intestinal contractions.

ADMINISTRATION.—Nux vomica, divided by grating or filing, may be given in the dose of five grains three or four times a day. But its activity is too variable to render this an eligible form of administering it. The alcoholic extract is more convenient, and, when well prepared, more certain. Its dose is half a grain, gradually increased to three grains. The tincture, like nux vomica itself, is of uncertain strength,

¹ Charleston Jour., xiii. 640.

³ Abeille Méd., xiv. 253.

⁶ Armstrong's Lectures, p. 409.

⁷ Hospital Facts and Observations, p. 42.

PLAGGE, Pharmakodynamik, p. 334.

⁸ Op. cit., p. 787.

Apparat. Med., i. 714.

⁶ Annuaire de Thérap., 1850, p. 22.

Bull. de Thérap., xlvii. 183.

but is usually prescribed in doses of from five to twenty drops. The first dose of strychnia should not exceed one-twelfth of a grain; it may be gradually and slowly increased until its effects are produced. It should always be diminished, at first, when a different sample of the drug is employed. It is usually made into pills with crumb of bread, or with conserve of roses, care being taken to divide it with accuracy. A preferable method, where its bitterness is not objectionable, is to dissolve a grain of strychnia in two fluidrachms of rectified spirit, with the aid of two minims of sulphuric, hydrochloric, or acetic acid, so that every ten minims of this solution shall contain one-twelfth of a grain of the salt of strychnia. When applied endermically, about half a grain of the alkaloid, or of one of its salts, should be used. On account of their greater solubility, the latter are here to be preferred.

ANTIDOTES.—From some experiments upon dogs, Dr. Pendell concluded that lard or other fat, taken before or along with strychnia, prevented its poisonous action. But Dr. W. H. Hammond, on repeating the experiment by giving two grains of strychnia with lard to one dog, and without this addition to another, found that the former died, but the latter was uninjured.2 Dr. Shaw, of Texas, saved the life of a patient who had swallowed from ten to fifteen grains of strychnia, mixed with food, by administering large draughts of sweet oil. The oil, however, acted as an emetic.3 Under similar circumstances, milk has served as an antidote. (Rifoldo.) It was inferred from some experiments by Prof. Haughton, of Dublin, that nicotine has the power of retarding, and, in certain cases, of counteracting, the effects of strychnia upon frogs. Dr. O'Reilly, of St. Louis, acting upon this suggestion, successfully treated, by means of a strong infusion of tobacco, a man who had taken six grains of strychnia. The spasms were arrested, and were followed by extreme prostration; but the patient recovered. The same gentleman has furnished several striking illustrations in man of the control which nicotine exerts over the spasmodic phenomena occasioned by strychnia. (Vid. Tobacco.) Dr. Harley determined experimentally that strychnia and wourali are also antagonistic in their operation. Animal charcoal has been proposed as an antidote by Mr. Chippendale. In a case reported by him, four grains of morphia and as many of strychnia were taken, and very probably the morphia may have acted, rather than the charcoal subsequently administered, to prevent, or at least delay, the poisonous effects. Such, in fact, was what occurred in direct experiments made by Rifoldo-Rifaldi. grain of strychnia was given to a dog, and in a few minutes afterwards a grain of morphia. The symptoms were slowly developed and slight, and the animal recovered. A similar result was long since obtained by Pelletier and Caventou. Chloroform, internally, is said to have arrested the symptoms in man. Camphor is also alleged to be an an-

¹ Am. Jour. of Med. Sci., Oct. 1855, p. 541.

³ Ibid., Apr. 1856, p. 547.

<sup>Ibid., Aug. 1862, p. 172.
Times and Gaz., Apr. 1855, p. 423</sup>

Journal Universel, Juin, 1819, p. 258.

² Ibid., Jan. 1857, p. 273.

⁴ Ibid., Apr. 1857, p. 551.

⁶ Archives Gén., Dec. 1856, p. 669.

Bull. de Thérap., xlix. 41.

tidote to this poison, by Dr. Arnett, of Louisiana, who states that he put an end to a violent tetanic attack by administering two fluidrachms of a saturated solution of camphor in whiskey at intervals of half an hour. Within two hours after the first dose, it is said, no unfavorable symptom remained. Dr. Woakes has proved very satisfactorily, by experiments upon animals, that aconite is a physiological antidote to strychnia, completely neutralizing, when given in the proper dose, the poisonous operation of the latter. We are not acquainted with any instance of the trial of this method in man.

It is evident that of these so-called antidotes some must act, if at all, by preventing the absorption of the poison from the stomach, and others by counteracting the nervous derangement and excitement which result from its absorption. Opium, nicotina, and camphor in large doses are all sedatives of the nervous system.

FABA SANCTI IGNATII.—BEAN OF ST. IGNATIUS.

DESCRIPTION AND HISTORY.—This medicine is the seed of Ignatia amara, or Strychnos Ignatia, of the natural family Strychnoæ, a small tree which is a native of the Philippine Islands. It is about the size of a small olive, but is irregularly flat on one side, and convex on the other. Externally it is rough and grayish. Internally it is of a horny aspect, semitransparent, and very hard. These seeds, to the number of twenty, are contained in a tough and ligneous envelop of the size of a large pear.

Lemery says it was a Spanish Jesuit who first discovered it to the Portuguese merchants, and called it by its present name. Its active properties depend upon strychnia, of which it contains three times as much as the vomic bean. Its proportion of brucia, on the other hand, is less.

The virtues of St. Ignatius's bean have always been regarded as identical with those of nux vomica, to the description of which the reader is referred.

TOXICODENDRON, vid. General Stimulants. ERGOTA, "Emmenagogues. Sodæ Boras, "Irritants.

¹ Charleston Journal, xii. 86.

² Brit. Med. Jour., Oct. 1861.

CLASS VIII.

GENERAL SEDATIVES.

It has been elsewhere remarked that the primary action of nearly all medicines is stimulant or exciting; and, indeed, the exceptions to this statement are so very few, that it has been doubted whether any really exist. Into this question, which is theoretical rather than practical, we do not propose to enter. From a therapeutical point of view it is easy to perceive that certain agents are endowed with the power of reducing the activity of one or more portions of the system, and that their predominant, if not their exclusive action, even upon the healthy organism, is of the same nature. There is, then, a class of sedative medicines. But, on narrowly examining it, we find that it is

susceptible of subdivision.

Life is recognized to exist, in general terms, by functional movements; and as by stimulants we mean medicines which directly augment and quicken those movements, so, on the other hand, by sedatives we imply medicines which directly diminish and lower them. The portions of the economy which more immediately serve as measures of vital activity are the arterial and nervous systems, and experience has proved that certain agents depress the one or the other of these or both of them together. Of arterial sedatives there are two, digitalis and veratrum viride, the effect of which upon the system is primarily, but not exclusively, to reduce the frequency of the pulse. Of nervous sedatives the number is greater, including, in this work, aconite, hemlock, cocculus, bittersweet, tobacco, lobelia, and white These medicines are usually ranked among narcotics, hellebore. but differ from the latter by an entire absence from their operation of any stimulant element, or, as in the case of tobacco, in the great predominance of its sedative over its stimulant action, and also by their exerting no soporific influence. Under the title of General Sedatives we include cold, and prussic acid, the former of which, as soon as it has overcome the momentary antagonistic excitement which its immediate action produces, lowers the activity of the nervous and vascular organs, and, by its direct influence upon them, may extinguish life. The only other member of this subdivision, prussic acid, is even more a general sedative; for although its primary operation is probably upon the nervous system, it so immediately afterwards depresses the arrest hemorrhage, to alleviate heat of the stomach, to palliate continued fevers, to promote perspiration, &c. Avicenna, and the Arabian writers generally, dwell with much emphasis on the virtues of cold water in febrile disorders, constipation, and some other affections of the bowels. Cold affusion was a favorite remedy among oriental physicians, and travellers report that it still continues to be employed by them. Very probably they derived the practice immediately from the Arabians, several of whose medical writers advise the use of cold affusions in febrile and eruptive disorders, and also the internal use of cold drinks to promote diaphoresis. Alpinus relates, while he condemns, the custom among the Egyptians of administering large draughts of cold water to hasten the operation of purgatives, but he admits that these medicines are thereby made to operate in less than the usual dose.'

When, on the revival of learning, physicians applied themselves to rescue from forgetfulness the medical experience of earlier ages, a large number of treatises on the uses of water were published. This was during the fifteenth and sixteenth centuries. Among them the most eminent was that of Bacci, or Baccius, which will be again alluded to. Others were published by A. Lusitanus, Pisanelli, Monardes, &c., of whom Boyer observes that their works give no countenance to the abuses which men of scanty knowledge, or evident charlatans, and even the public profess to found upon them. the middle of the sixteenth century cold water became a fashionable remedy, and was very much employed externally; but its internal use was still more general, at first, indeed, almost exclusively among the higher classes, but afterwards among the populace also. The excesses which it occasioned were denounced by De Vega, who drew a striking picture of its evil effects, to which many princes and noblemen had fallen victims. In the seventeenth century a number of writers extolled the usefulness of cold drinks in febrile affections, and of cold enemata in various disorders of the pelvic viscera. Before this period the practice had been confined to the warm climates of Southern Europe, but it now invaded more northern regions. Van der Heyden, of Ghent, published in 1645 a treatise in which he endeavored to show that cold water is useful in indigestion, rheumatism, and gout, that it arrests commencing inflammation, hinders suppuration, and alleviates the pains of stone; also that cold affusions are excellent in hemicrania, and cold enemata in dysentery. Soon afterwards appeared at Copenhagen the treatise of Bartholinus, De Nivis Usu medico, which contains a summary of all that had been previously written upon the subject. At the close of the same century the publications of Floyer began to appear in England, and almost simultaneously the cold water treatment was revived in Italy, and rendered very popular by a charlatan named Magliano. The extravagances of his method indeed fell speedily into oblivion, but the treatment by cold water was adopted by a certain number of physicians. Between 1720 and 1730, Todaro, of Parma,

De Medicina Ægypt., p. 285.

² Recherches sur l'Hydrotherapie. Par A. L. Boyer. Strasbourg, 1843.

locality. "A lady was affected in almost all her joints with gout, which had resisted every mode of treatment. At last she was treated in the following manner: Cold affusions and lotions upon the bare head and body; wrapping in sheets soaked in cold water, and which were kept constantly wet for the space of two nights and two days; she sweated and recovered." The method of Hahn found imitators in Germany, but, like its English model, soon fell into disrepute, and only continued to be employed by the Silesian horse-doctors in the service of their patients, both quadruped and biped. Mention is made by Geoffroy' of a Franciscan monk in Malta, who treated acute and chronic diseases very successfully with cold drinks. Indeed he allowed his patients no food whatever, and no nourishment but water. In dysentery and inflammations of the pelvic viscera, he prescribed enemata of ice water.

From this period until near the close of the eighteenth century there exists but little trace of the medicinal use of cold water, but at the last-mentioned date, Robert Jackson, and soon afterwards Currie, brought it once more into notice. The former employed cold affusions for the cure of fever as early as 1774,2 and the latter used it for the same purpose in 1787. Both were led by fortuitous circumstances to the adoption of this practice; Jackson by learning that some twenty years before a number of patients on board a hospital ship had, in the delirium of fever, thrown themselves into the sea, and that the survivors from drowning were restored to their senses. Currie was indebted to a paper published in 1786 by Dr. Wright, who therein mentions having successfully employed affusions of cold sea-water when he himself was ill with fever on shipboard some years before. The works of Currie and of Jackson will be referred to for illustrations of the treatment of various diseases by cold water. In spite of the interest which attached to their writings, heightened, as it was, by a contest between them for the honor of having revived so valuable a therapeutic agent, the method once more fell into comparative disuse. It certainly had ceased to form a part of the systematic treatment of either acute or chronic diseases, and to the greater number of practitioners was perhaps entirely unknown, when it once more rose into a higher repute than ever before, and was celebrated by charlatans and not a few physicians in every part of the world as the rightful successor or supplanter of all previous medical systems. Yet its vogue is already declining; the exaggerations of candid but too credulous inquirers, and the monstrous misrepresentation of avowed partisans, are rapidly shrinking into more rational proportions, and there is even reason to fear that the mischiefs of the system will cause its benefits to be forgotten.

The last avatar of the watery divinity, whose career has just been sketched, is represented by Vincent Priessnitz, the keeper of a wretched road-side inn at Græfenberg, in Austrian Silesia. This peasant seems to have possessed much native shrewdness, which enabled him to make use of some vague notions gleaned among the neigh-

¹ Mat. Med., i. 84.

² Treatise on the Fevers of Jamaica, 1791.

of the same nation in which similia similibus medentur was proclaimed as an infallible and universal principle. Nor is it less remarkable, as an illustration of the effrontery of medical impostors, that many of the sectaries of the latter heresy are the boldest trumpeters of the former, although each necessarily excludes and contradicts the other. The interpreter of nature, indeed, adopts neither dogma; for he perceives that neither forms the principle of more than a limited class of facts. As exclusive systems, he rejects both, but is equally ready to adopt the perturbating method of Priessnitz or to imitate Hahnemann by withholding all medicine, when either seems more appropriate than the medicinal treatment which, in the great majority of instances, effects the guidrest refeat and most agreeable cure

effects the quickest, safest, and most agreeable cure.

SURGICAL HISTORY.—The ancients do not appear to have employed cold as an external agent in surgical affections, to as great an extent as modern physicians. Traces can nevertheless be found of their partial acquaintance with its value. Besides those which have been mentioned incidentally, may be cited the testimony of Celsus, who mentions the power of cold water in arresting hemorrhage,1 and that a slight wound is helped by laying on it a sponge squeezed out of cold water. But, he adds, in whatever way it is put on, it does good no longer than it is moist. There is no prominent mention of the subject by surgical writers of note, during the long period that elapsed between the time of Galen and the fourteenth century. The gross polypharmacy which had so long prevailed, then began to be supplanted by an affected simplicity of treatment. Wounds, ulcers, and many cutaneous affections were treated by water alone, or by water in which some unimportant substance had been dissolved, and which was dignified by a singular or sonorous name. But it was not until the middle of the 16th century, after the return of the French from the Italian wars of Francis I., that the value of cold water was recognized in the treatment of injuries and wounds. Ambrose Paré contributed not a little to make the method generally accepted, although he himself adopted it reluctantly, because it was generally practised by quacks, and disfigured by superstitious practices. few years later (1570), Palazzo published a treatise on "the true method" of curing wounds with pure water and pledgets of linen, in which he holds up to ridicule the charms and superstitious observances which were popularly thought to make the applications useful. In 1601, Martel, wrote an apology for his own use of cold water, in which he defended the practice against the attacks of those who stigmatized it as unprofessional. His estimate of the plan he expressed in the words: "I consider that keeping wounds clean is one of the chief means of promoting their cure; now it is certain that water cleanses and purifies them thoroughly. By its coldness it prevents inflammation, moderates the acrimony of the humors, &c." According to Percy the employment of cold water was gradually supplanted, in the northern part of Europe at least, by a variety of vain or superstitious practices,

¹ Book v. ch. i. and xxvi.

² Percy, Diet. de Méd., tom. x.

tion was adjacent, and not less extensive, was accustomed to treat all wounds of the soft parts in persons of a good constitution, by cold water applied over a dressing of simple ointment, and kept cool by constant renewal. But he soon learned that the method was not of universal application. Some patients suffered from the sensation of cold, and a still greater number did not continue to be benefited by its operation. His practice, therefore, was to discontinue the application whenever it appeared to produce chilliness or pain, when the parts become callous by its use, and when it seemed to check suppuration unduly. These views were systematized and more extensively applied by Macartney.

During the long peace which followed the year 1815, there was little occasion to resort to cold water dressings in military surgery, and they seem to have again fallen almost completely into disuse. The next revival of their employment is perhaps traceable to the notoriety of the Silesian water cure. It was, at least, several years posterior to the establishment of the latter in 1834, that Josse of Amiens employed with great success continuous irrigations in various inflammatory affections and injuries. According to the published account of his experience, it would seem to have been not only exempt from accident, but even remarkably successful. Mayor, of Geneva, Liston, and Malgaigne, attributed excellent results to the treatment of surgical affections by cold water. The last preferred irrigation to other methods. He, as well as Nélaton, and many other surgeons, considered it as chiefly applicable to contused and lacerated wounds of the head and extremities.

In spite of the use of the cold water dressing by so many distinguished men, at so many different periods, its last revival was fated to the same issue as preceding ones. On account, as Amussat suggests, of the care and caution which the method requires, and especially of the evils which it sometimes occasioned, it has been gradually once more abandoned by the most eminent surgeons, and is now very rarely used in hospital practice.

ACTION.—The temperature of the human body varies with that of the surrounding medium. In the mouth and rectum it is about 98°F., and in the blood, according to Magendie, 102° F. Inflammatory diseases may raise it to 102° or 106°, and in scarlet fever it sometimes reaches 112°. In malignant cholera, on the other hand, the temperature of the mouth has fallen as low as 77°.

In health, the animal temperature is very nearly uniform, owing to the combined influence of food and the interchange of caloric with surrounding objects; but if these influences are suspended, and the outer air grows cooler, the temperature of the body may fall considerably. To maintain a moderate and equable degree of warmth in the system clothing is employed, and varied with the season. The warmest material for clothing, that is to say, the least perfect conductor of heat, is made of furs or feathers; silk follows next in order, then wool, cotton, and finally linen. The thickness of a garment made of any among these materials, is of course an important element in estimating

its power of retaining the animal heat, so that the better conductor may make the warmer garment owing to its thicker and closer texture. Cold air abstracts heat chiefly from the surface of the body. Water also absorbs internal heat, when employed in the form of cold drinks and cold enemata.

The exhalation of aqueous vapor from the lungs and skin is the principal means by which the animal temperature is lowered; but the activity of this process depends upon the hygrometric state of the atmosphere. Therefore, warm and moist air augments the suffering from heat in summer, while cold and damp air produces a corresponding increase of distress in winter. In the latter season dry air is the most agreeable and healthful, when the temperature is at or near the freezing point, and in summer, also, under almost all the ordinary conditions of heat at that season. Cold and dryness combined give rise to a copious exhalation of aqueous vapor, as well as of heat from the body, and make, therefore, a large demand upon its nutritive function to supply the loss. This is one cause of the more vigorous appetite, and digestion enjoyed in winter. In summer, on the other hand, the loss consists in a much larger proportion of fluids, particularly of perspiration, hence the craving for liquids, and the desire to drink them cold in order to moderate the painful accumulation of heat

within the system.

When the body is exposed to a moderate degree of cold, the skin at first grows more ruddy, and the sensation of coldness is felt in the fingers, the tip of the nose, the ears, and other parts which are comparatively unprotected, and are remote from the central organ of the circulation, and owing to the smallness of their mass, are readily exhausted of their caloric. If the cold acts upon the entire surface of the body, as in a bath at 60° F., for example, the temperature of the hand may fall from 98° to 72°, while the interior of the body probably does not change its temperature at all. Dr. Speek, while immersed in a bath as high as the breast, received upon his head a stream of water from a height of nine feet. The temperature of the water was between 68° and 73°, and the duration of the bath from six to twelve minutes. During the experiments the thermometer bulb was held in the mouth. This instrument indicated a diminished temperature of between 1.08° and 2.89°, and the loss of caloric was greatest when the water was coolest.1 As the temperature of the body falls, the skin grows pale and shrivelled, and has more or less of the appearance known as goose flesh, and the nipples and the penis are shrunken. Wherever a part thus loses its volume, the capillary vessels no longer supply it so abundantly with blood, and to this circumstance, and to the absence, or at least the diminution, of the calorifying processes which result therefrom, must be attributed the sinking of the temperature. The influence upon the pulse of cold applied internally in the form of cold water, has been studied experimentally by Lehmann, and by Dr. H. Bence Jones and Mr. H. Dickinson, who all found it low-

^{&#}x27; Arch. der wissent. Heilkunde, v. 422.

³ Times and Gaz., April, 1857, p. 421.

ered in a degree proportioned to the coldness of the water. The douche has also a more marked influence than other baths, especially when the volume and shock of the water are great. The sensibility is also lessened by the application of cold to the whole surface of the body, and when it exceeds a moderate degree numbness is produced. At the same time all of the secreting organs perform their functions imperfectly, and the muscular system is more or less torpid. The operation is, however, followed by an increased discharge of urine.

The inspiration of cold air produces marked effects. It acts more powerfully upon the nasal passages than upon the trachea and its branches, because in the latter it is tempered as well by admixture with the expired air, as by the heat of the parts themselves. Dry air abstracts caloric from the lungs more rapidly than moist air, because it more readily absorbs the pulmonary exhalation; but this cooling process is more than compensated for by the greater proportionate quantity of oxygen which such air supplies to the blood, and by the slighter abstraction of caloric which it makes directly from the surface of the body and of the respiratory mucous membrane. But if dry, cold air is inspired immediately after the respiration of warm air, the former acts as an irritant upon the relaxed mucous membrane, checking its secretion and often causing it to inflame. The danger of this result is greatly increased when the air is both cold and damp. It then acts not only as a local irritant, but also by abstracting heat from the surface of the whole body, it lessens that power of reaction which, when the air is dry, tends to ward off the injurious local effects of cold. Furthermore, it drives the blood inwards upon the organs of the trunk, and disposes them still further to inflammatory disease.

Ice, snow, and very cold water, taken internally, produce phenomena which vary only in degree. The ordinary effects are a sense of coldness in the mouth, throat, and stomach, and more rarely, a general shuddering, and a slight diminution of the frequency of the pulse and of the heat of the body. In large quantities they may produce pain in the stomach, trismus, various spasmodic phenomena, and even sudden death; in other cases vomiting, decided chill, and occasionally inflammation of the stomach and congestion of the lungs or brain. permanent sedative action is not to be looked for, but, on the contrary, the secondary effect of a draught of cold water is to increase the animal heat, quicken the pulse, and augment the perspiration.2 The conditions which favor the injurious action of cold drinks are, as Rush first pointed out,3 general heat of the body, emptiness of the stomach, the large quantity of liquid taken at a time, and the low temperature of this liquid. These effects, which are remarkably frequent in the United States, have been amply illustrated by Rush, Brewster, Carroll, and later American writers. The symptoms, as described by Brewster, are these: Soon after the patient has swallowed the cold water, he feels an uneasy sensation about the scrobiculus cordis, which,

¹ Mitscherlice, op. cit., i. 404.

² MITSCHERLICH, op. cit., i. 406; GUERARD, Bullet. de l'Acad. de Méd., vii. 422.

Med. Obs. and Inquir., i. 193.

⁴ Phila. Jour. of the Med. and Phys. Sci., xi. 99. ⁵ Ibid., xiii 122.

exhaustion follows, the senses become obtuse, and by degrees all signs of life vanish. When the abstraction of heat takes place rapidly, sleep is induced which tends to pass into insensibility, and sometimes into The body is pale, and feels hard and cold; the features are usually calm, but sometimes distorted; the mouth is shut, the feet and limbs are drawn up, the eyelids open, the cornea is turbid, and the excrements are no longer discharged. But even this degree of general congelation is not always fatal, but is attended with such a degree of torpor only as does not entirely preclude recovery, provided that heat be gradually and systematically applied. Humboldt showed that when the irritability of a frog's leg is diminished by cold, it can nevertheless be again revived by a gradual restoration of warmth, while under the sudden or rapid restoration of heat it displays only a brief and feeble vitality.

The more strictly local effects of severe cold are observed in the parts above enumerated, as those which first suffer from its general application, the nose, ears, fingers, &c. After having become insensible, the frozen portions are either covered with blisters, or the color of the skin changes to livid or black, showing that gangrene has set in, which, if the cause continues to operate, merges into sphacelus; the part appears to the sufferer singularly heavy, and the epidermis, when peeled off, shows the livid and marbled chorion beneath. The flesh then grows soft and exhales a putrid smell; and the fingers, the toes, or a whole limb, even, may perish and separate spontaneously

from the body.

After death from cold alone the external parts are generally pale and bloodless, with diffused patches of bluish redness on the more dependent parts; the brain is generally pale from the absence of blood, which is also deficient within the abdomen, while the lungs are usually engorged, and the heart, especially on its left side, is distended with blood, as are also the large vessels attached to it. The blood itself is less dark in color than is usual after death, and speedily becomes

brighter on exposure to the air.

The action of cold upon the animal economy varies according to the conditions of rest or motion of those who are subjected to it. effects in the first case have already been pointed out. They are of a depressing, benumbing, and debilitating character. But the same degree of cold will produce the very opposite effects upon a person in active motion. It will develop color, strength, and warmth, instead of producing pallor, feebleness, and coldness, activity instead of torpor, vivacity instead of dulness. Under its influence the appetite grows keen and the digestion vigorous—life exhibits its perfect energy. On the other hand, when the body at rest is exposed to cold air in motion, the ordinary effects of cold are greatly intensified. The air rapidly carries away the heat of the body, and excites severe pain wherever it comes in contact with the skin. A slight degree of cold, or what, for the present purpose, is the same thing, a partial application of severe cold to the surface of the body, acts, at least indirectly, as a stimulus, and probably by the painful sensation it excites. This may be well illustrated by the fact that the cold hand placed upon the abdomen of

astrous compaign, the soldiers, oppressed with weariness, gave themselves up to the seductive approaches of sleep; some were even indifferent to death. Many had their limbs frozen, and were but too happy to escape thus alive; some, stopping to obey a call of nature, perished where they halted. After the pillage of Kowno, eight hundred intoxicated men slept in the snow, and never woke again. Horsemen who had been obliged to wear their boots for several days together were surprised, at the end of this time, to find their toes or feet frozen. Sentinels were frozen stiff and motionless at their posts. Comrades were obliged to warn one another of the state of their ears and noses, for the vitality of these organs was frequently destroyed without the least consciousness on the part of the sufferers.

REMEDIAL OPERATION.—The sketch that has now been given of the properties of cold in its relation to animal life renders it evident that the mode of its action is not simple and uniform, but multiple and various, according to the circumstances under which it operates. According to the nature of these, cold may be refrigerant, excitant, sedative, astringent, tonic, debilitating, or perturbating. Its refrigerant property renders it applicable to all cases in which the heat of the whole or any part of the body is excessive, and enables it to check inflammatory processes tending to disorganization or other substantial In proportion to the suddenness of its application, cold becomes a stimulant, indirectly, however, through the reaction which follows its contact with the body. It acts upon the general sensibility to arouse the whole system to greater activity, as in cases of suspended animation, of paralysis, or of atony affecting particular organs. Cold is a powerful sedative by means of its prolonged influence upon the whole or any portion of the body, relieving the pain, heat, and swelling of local inflammation or of determination of blood, and indirectly subduing the excitement of the nervous and circulatory systems dependent upon these causes. This property may be illustrated by the pale and shrivelled aspect of parts subjected to cold, and by the readiness with which erectile tissues shrink under its influence. Pathological facts may be cited to the same effect. It also acts through the impression which it makes upon the vaso-motor nerves, causing a contraction of the bloodvessels; and this is often an excitomotory operation. The flow of the menses, of the milk, or the perspiration, is interrupted by cold applied to the feet or other remote parts of the skin. In Italy, it is said that the peasant women arrest the secretion of milk in their breasts by having very cold water dashed between the shoulders, and prevent its establishment after childbirth by means of cold applications to the mammæ.

The astringent action of cold is, for the most part, a mechanical effect; it is, however, carried further in living than in dead matter, because the fluids are more easily moved in the former than in the latter, and because a sedative influence accompanies it. Hence it empties an inflamed or swollen part of its fluids by a direct mechanical or constringing power, and at the same time subdues the local excite-

¹ Moricheau-Braupré, Effets du Froid, 1817.

augment and station in nearly all the graver forms of idiopathic fever, or when it assumes a typhoid type during one period or another of its Most of the cases of "inflammatory fever" (Synocha, Cullen) which are contained in the works of ancient and modern writers, were probably examples of symptomatic fever, the source of which was unsuspected, or at least undetermined. In this, however, as indeed in all forms of fever, whether idiopathic or symptomatic, cold has its appropriate uses, which are especially to moderate the heat of head, cerebral excitement, and thirst, which are common to them all. But it is in the graver forms of fever, and especially in typhus (t. petechialis), that the value of the remedy is pre-eminent. It was for this affection that Currie so successfully used cold sea-water, at 44° F., of which several gallons were poured over the patient's body. When applied at the onset of the disease, it sometimes arrested the attack abruptly and by a single effusion. But a day or two, or even a few hours, later, the result was less prompt, and the application had to be renewed. In these cases the heat of the skin was always great, and usually at or above 100° F.; a lower temperature than this was not considered to warrant the employment of cold affusions. The preceding statement is in full accordance with the results of Jackson's experience. "The period," he remarks, "within which a complete and final cure may be expected to be attained with confidence, is comprehended within the third day." At a later stage of the attack, this method may, perhaps, palliate the symptoms, and even determine a salutary issue of the disease, but will not much, if at all, abridge it. All experienced writers on this subject coincide in the opinion here expressed. One of the most eminent, Armstrong, uses language almost identical with Jackson's. "During the first, second, and third days of the stage of excitement," he remarks, "more especially during the first, I have sometimes seen the simple typhus entirely extinguished by the affusions of cold water but from the fourth day of this stage, I have not often seen them useful."

In typhoid fever (slow nervous fever, dothinenteritis, typhus abdominalis, enteric fever), cold affusions are of slight advantage, if, indeed, they are not positively injurious. The disease will run a definite course, usually exceeding a fortnight in duration, and cannot be cut short by cold, and probably by no agency whatever. The cerebral symptoms may indeed be palliated by cold lotions applied to the head, or even by cold affusions upon this part, but the application of cold water to the entire surface of the body ought, perhaps, in every instance to be avoided. The patient may be placed in a warm bath, while cold water is poured upon the head, with great advantage in those cases of the disease which are distinguished by violent delirium, or profound coma, with cool extremities and a collapsed state

of the cutaneous surface.

The general success of the method under notice is attested by a great number of physicians, to some of whom reference may be made.

An Exposition of the Practice of Affusing Cold Water, &c., p. 183.

² Pract. Illustrations of Typhus, &c., Am. ed., p. 65.

haps would its revival have taken place but for the attention drawn to the subject by the temporary influence of the hydropathic heresy. As Schedel points out, in spite of the general approbation which the method once enjoyed, it soon became reserved for exceptional and urgent cases. When once the epidemic declined which had rendered it popular, the treatment also fell into disuse. Some, like Bateman, did not find it to fulfil the hopes entertained of it, and employed sponging with cold water in its stead. Others relinquished it, and this was perhaps the most common case, on account of the strong aversion to it on the part of the sick, and of the great trouble its employment entailed, so great, indeed, that in private practice it could seldom be resorted to efficiently.

The conclusions which seem to be fairly deducible from the evidence now referred to may be thus summarily stated. Cold affusion forms a powerful, safe, and prompt remedy for typhus fever if applied within two or three days of the onset of the disease, if the patient is vigorous, if the heat of the skin exceeds 100° F., and if no intercurrent inflammation exists. At a later period of the disease, it can act only as a palliative, and is not unattended with danger. At all stages, however, of the augment of typhus, cold sponging of the entire surface of the body tends materially to moderate the febrile action; and throughout the disease cold, in any form, applied to the head, is an indispensable remedy for the delirium and cerebral excitement which

belong to this affection.

Eruptive Fevers.—The treatment of exanthematic fevers by cold water is far from being new. Kæmpfer makes mention of it in measles, and Bartholini and Theden in smallpox. Smith refers to the plentiful use of cold drinks in smallpox as very useful, although in opposition to the received opinions of his day. Sir John Floyer relates several cases of the same disease in which the patients recovered after having thrown themselves into cold water, and Currie several, also, in which its application may have done good. But such instances must be regarded as exceptional, rather than as grounds on which to base a rule of treatment. It does not follow, on the other hand, when the imperfection of the eruption, or the feebleness of the patient, forbids the use of cold water, that the old practice of endeavoring to force a development of the eruption by thick bed-clothing, and by excluding the fresh air, is to be commended. On the contrary, in all of the exanthemata, though in measles with greater circumspection, cool air should be freely admitted, for it goes far, at least to assuage the irritability of the skin. Hancock, Kæmpfer, and others, indeed, report cases in which cold drinks, and even cold affusions, seem to have been serviceable in measles. Guersent approves of the latter when there is no pulmonary inflammation, and Giannini expresses a similar opinion. The method can seldom, however, be appropriate in a disease comparatively of such feeble action as measles, and in which the pulmonary complication usually contraindicates it. The only form in which cold would here seem to be allowable is that of the wet sheet thoroughly wrung out and covered, immediately after its application, with blankets.

But it is in scarlatina, a fever in which the skin grows hotter than

whole, however, a less energetic use of cold has been found to suffice in the sthenic forms of the disease. Dr. Jackson, then of Northumberland, Pa., first called attention to the advantages resulting from the use of iced drinks, and of pieces of ice held constantly in the mouth. The latter he confined in a gauze bag when the patients were too young to avoid swallowing them. He directed the remedy to be used almost without intermission until the local swelling and the heat of skin began to decline. A more energetic plan than this, and safer than that of Currie, is the one successfully employed by Dr. Corson, of Conshohocken, Pa., who, in addition to the means recommended by Dr. Jackson, applied ice to the sides of the neck opposite the swollen tonsils, in some instances, and in others, surrounded the throat with cloths kept wet with ice water. At the same time, he used the latter in affusions upon the head, and as a lotion to the whole body. In this manner, cases of extreme severity were cured. It is proper to mention that the hydropathic authorities blame this practice as dangerous, particularly when the fever is high, unless the wet sheet is applied at the same time. They employ the so-called "stimulating compresses" to the throat, renewing them as often as they become dry, and giving iced water constantly to drink.3

Periodical Fevers.—Cold has been applied in these affections in three different modes: 1st. To prevent the paroxysm; 2d. To arrest the paroxysm in its hot stage; and 3d. To fortify the system against a relapse. Currie, Giannini, Beaupré, and Bailly used it before the rise of the modern water cure, and of these authors the second attributed to its use a prompt and powerful effect in arresting the paroxysm. Beaupré, in like manner, treated with immediate relief, and ultimate success, cases which already wore, or which threatened to assume, a malignant type, cases in which the fever was violent, the countenance injected, the respiration laborious, and the mind either morbidly excited and confused, or dull. A cold bath, lasting about ten minutes, put an end to the paroxysm. The same means were resorted to anew on the return of subsequent paroxysms, and bark was exhibited in the intervals between them. The results of the so-called "water cure" in these diseases are far from encouraging. The frictions with cold water during the chill, the packing during the hot stage followed by renewed frictions and ablutions, with variations of these measures during the apyrexia or remission, seem to have had a far less decidedly curative effect than various medicinal plans, to say nothing of the specific treatment by quinine or arsenic. But simple cold affusions, in anticipation of the paroxysm, as recommended by Currie, have more evidence in their favor. In a paper presented to the Parisian Academy of Sciences in 1848, M. Fleury furnished the results of his use of the douche in various forms of intermittent fever. All of the recent cases, seven in number, were permanently cured by, at most, four applications of the remedy. Four patients had been affected with the disease between two and eleven months, and had used quinine

Am. Jour. of Med. Sci., xii. 261 and 550; and ibid., xxii. 45.

² J. F. Meigs, Diseases of Children, p. 4×0.

Schedel, op. cit., p. 170.

Archives Gén., 4ème sér., xvi. 289.

tine, and were applied directly to the integument, or over adhesive plaster.1

Cold drinks, as every one knows, afford great alleviation to the heat and thirst experienced during warm weather, particularly when they contain a vegetable acid. They are not less agreeable and useful palliatives of the morbid heat which is created by febrile affections, including the phlegmasiæ. Nothing is so grateful, or so promptly arrests vomiting in gastric inflammation. On the other hand, debility of the stomach is sensibly lessened by drinking a glass of cold water before meals.

Cold has been used in treating erysipelas, but examples are not wanting of serious symptoms, such as delirium and coma, and even death, following its application in the idiopathic form of this disease. A mode of applying cold in erysipelas has been proposed by Dr. Arnott, which is certainly a bold suggestion, and, were it not sustained by actual experiment, is not of a nature to invite imitation. It consists in applying to the inflamed surface, by means of a flat sponge, or a thin gauze bag, a mixture of pounded ice and salt for about ten minutes, until the skin becomes white and hard. According to the cases reported, the inflammation does not return in the parts that have been congealed. Dr. Arnott assures us that the remedy is not only certain and speedy in its operation, but also agreeable and safe. no instance out of hundreds in which it was employed for various purposes, did it produce any injury or untoward consequences.3 It is incorrect to say, with Dr. Arnott, and Dr. Watson, whom he quotes, that there is no such hazard as we read of, that erysipelatous inflammation may be repelled from the surface and attack some vital organ. If examples of this accident are not numerous, they exist, nevertheless, and ought to serve as a warning against so extreme a measure as Dr. Arnott recommends. Tepid affusions and emollient applications are not only more grateful to the patient, but also more useful, and at the same time safer. In traumatic erysipelas, however, fluids, may be applied at a lower temperature with less risk of harm, because the disease is more strictly local.

Other accidental inflammations, such, for instance, as are occasioned by friction of the clothing, or of the thighs or buttocks, in walking, by the bites of insects, the irritation of nettles, of the poison oak, and of the urtica marina, or sea nettle, a gelatinous animal that abounds on the beach at our bathing places, are satisfactorily treated by cold water. Dioscorides recommends it in excoriations, and for bites of venomous insects and reptiles. Non-febrile diseases of the skin are less usefully affected by cold than by warm applications, which, indeed, in the form of baths, form an essential part of their treatment. In several establishments devoted to the methodical treatment of skin diseases, cold water has been put to the trial, but the results are not such as to

encourage a renewal of the experiment.

The general sentiment of the profession is adverse to the use of cold applications to the trunk in the treatment of its internal inflammations,

¹ Abeille Méd., x. 63.

² Lancet, 1841-2, ii. 439.

except when the vigor of the patient is unusually great. Perhaps the sentiment is more in the nature of a prejudice than a conviction. But cold drinks and cold enemata are of the greatest service in sthenic inflammation of the stomach or bowels. In thoracic inflammations,

warm and tepid drinks are to be preferred.

Cold is one of the most efficient remedies for cerebral excitement, such as occurs in febrile diseases generally, as well as for positive inflammation of the brain, or its membranes. Pounded ice, or, what is preferable, iced water, and artificial refrigerant lotions, constitute, perhaps, the most effectual means of overcoming the last-named disease, as well as for reducing cerebral excitement of a symptomatic character. Abercrombie calls it by far the most powerful of local remedies in cerebral inflammation, and mentions the cold douche as the most efficient form in which it can be employed. Indeed, when a stream of cold water is directed against the crown of the head, and continued for some time, it forms a remedy of such energy as to require to be used with much caution. Two apparently opposite conditions exist, in both of which this remedy is indicated; the one in which there is maniacal excitement, the other where the functions of the brain appear to be oppressed. The former is that to which Abercrombie has especial reference, and which belongs to the early and active stage of cerebral inflammation. When this has passed, or when, without its having existed, an effusion within the cranium is indicated by the tendency to coma, the dilated pupils, and an infrequent and slow pulse, cold affusions on the head may produce the happiest results. But the water must be of low temperature (about 36° F.), must fall from a height of two or more feet, and its application must be renewed at intervals of three or four hours. If perspiration breaks out, the affusion should be suspended. Probably more hopeless cases of such affections have been cured by its means than by any other. mediate effect being to restore some degree of consciousness, it is probably also accompanied with a renewed power of assuming a more healthy action by virtue of the innate powers of the system, or through the operation of other remedies, both internal and external. remedy which should never be omitted from the treatment of any case, the symptoms of which denote pressure upon the brain. In some cases of acute meningitis, it has saved life when all hope was lost.2 It would be extravagant, however, to expect from this remedy, powerful as it is, any substantial benefits when plastic effusion to any considerable extent exists. A cautious trial of it in doubtful cases will generally afford grounds for continuing its use or for relinquishing it.

Rheumatism and even gout have been treated by cold water from time immemorial, and in every age some writers may be found to favor the method. Hippocrates, Galen, and Celsus, speak of cold affusions as relieving the pain and reducing the swelling of inflamed joints. Barthez, while confirming this statement in regard to gout,

See Schufzenberger, Abeille Méd., xii. 238.

Diseases of the Brain and Spinal Cord, Am. ed., p. 174.

cautions against the use of too cold a liquid, especially before the affection becomes thoroughly localized. This danger apart, however, he regards the means as tending powerfully to promote diaphoresis, and in that way to dissipate the disease. Compresses thoroughly wrung out of cold water and covered with dry cloths, form the principal means employed for these disorders by the modern hydro-Such applications, it will be observed, become warm so rapidly, that the patient is but little, if at all, exposed to the danger of displacing the gouty inflammation. Of all the local means employed, it is the most efficient in alleviating the pangs of this severe disease. It need not of course exclude the use of internal remedies, and particularly of colchicum. In rheumatism the same mode of treatment is frequently of signal service. By the partisans of hydropathy, frictions with cold water, followed by sweating in the wet sheet, are recommended as sovereign and certain cures. This assertion may be true as regards general rheumatic fever of slight severity, but is incorrect if applied to severe articular rheumatism. For this disease, the treatment by cold water offers no more advantages, but many more inconveniences and dangers than the other recognized methods. When acute rheumatism is confined to certain joints, the use of wet compresses, as just now described, presents a more certain and less annoying mode of local treatment than perhaps any other. In the decline of the disease, or when it has become chronic, the cold douche, followed by the wet compresses, will seldom fail to remove the pain, swellings, and stiffness, particularly if frictions and a moderate degree of active or passive motion of the part be conjoined.

Scrofula.—Cold bathing, and especially sea-bathing, has always been regarded as a powerful means of counteracting the development of scrofulous swellings, inflammations, and ulcers, and of healing the The local application of cold compresses has more recently been employed for the same purpose. Combined with appropriate exercise and diet, the stimulant and curative effects of cold in these disorders is incontestable. They were among the most striking advantages of the ancient systems of hydriatry, and that they still have a claim to confidence, is shown by abundant examples of their curative effects. There is no evidence, however, that the peculiar appliances of the Silesian system are more effectual than such as have been established by long experience. Cullen observes that cold bathing seems to have been of more benefit than any other remedy he had occasion to see employed.' White recommends it, in common with many other writers, as one of the best prophylactics against scrofula; Russell ranks cold sea-bathing among the first of remedies for this disease; Phillips shows that the temporary benefits of sea-water are at least decided, although he questions its curative power. Lebert accords to the forced sweats, &c., of the hydropathic system, an incontestable value,3 and Schedel regards these measures as powerful and useful adjuvants to a well-regulated dietetic and medicinal plant.4

Works, ii. 637.

³ Maladies Scrofuleuses, 104.

² Cooper's Surg. Dict., Art. Scrufula.

⁴ Op. cit., 513.

palpitations of the heart, but after the third or fourth day these phenomena ceased. The appetite and strength soon increased, the stools grew regular, and the neuralgic symptoms disappeared. Afterwards the skin became ruddy and clear, the menses were re-established and became both more abundant and less painful. Idiopathic anemia, and that which is symptomatic of convalescence from tedious diseases, of certain uterine affections, of neuralgia of long standing, of hypertrophy of the liver or spleen, of miasmatic cachexia, chronic inflammation of the digestive organs, profuse and repeated hemorrhages, &c., were found by M. Fleury to be thoroughly curable by cold affusions. When the anemic condition depended on an organic yet removable cause, on the one hand, or upon incurable disease upon the other, the strength of the patient was still materially improved. In the former case the cure of the principal disease was rendered more practicable, and in the latter the general health and comfort were in many instances promoted.

Diseases of the Nervous System.—An affection very nearly allied to the one just noticed has been described by various authors as susceptible of cure by the same means. It is one of nervous exhaustion, a state which seems to be almost the normal condition of certain delicate individuals, but which may also proceed from prolonged fatigue, wasting discharges, undue exertion of the mental faculties, &c. This condition is very certainly relieved by a judicious use of cold water. But very often the patient is too feeble to react under even a trifling and partial application of cold. When the constitution, says Beaupre, "is extremely delicate and susceptible, the skin cold and pale, or of a dusky leaden hue, when the eyes are dull, the flesh soft, flabby, or cedematous, the perspiration viscous and cold, the pulse small and feeble, and there is a frequent sense of chilliness," the free use of cold applications in any form will be attended with danger, and certainly produce no good. In such states as are here referred to, the use of the cold bath should be approached very gradually, and means vigorously employed promptly to restore the circulation to its full activity. By such a method the dangers referred to may be averted, and the full tonic power of cold, with all its advantages, employed. There is an original state of the constitution the general features of which are closely analogous to those of the acquired condition just described, and which has a strong tendency to favor the development of organic diseases, and especially those of a lymphatic nature. It is a state of general debility, as shown by muscular weakness, a pale, transparent and flabby skin, a languid circulation, and a morbidly susceptible nervous system. It is most distinct in children, and, unless early checked and modified, leads, as has been stated, to serious and even Cold bathing, and especially the cold douche, is the fatal disease. most efficient auxiliary in renovating this constitution, and converting it gradually into a condition less susceptible to morbid impressions; but this means must be united with active exercise, wholesome nourishment, and the withdrawal of all merely nervous stimulants.

Insanity. The paroxysms of furious delirium which frequently attend insanity are more effectually moderated by the cold douche than by any other means whatever, and when the disease is acute, this treatment often brings about a perfect cure. Its efficacy is greatly increased by being administered while the patient is in a warm bath. In the intervals between the baths cold compresses may be applied as often as possible to the bare scalp. The method employed by M. Brierre de Boismont was so successful as to merit particular notice. The patients remained from eight or ten to fifteen hours in covered baths at from 82° to 86° F., while a current of cool water flowed continually over their heads. The temperature of the affusions was from 40° to 60° at the commencement of the bath, and at its conclusion from 64° to 68° F. The following are among the inferences drawn from his experience by M. Brierre: 1. Acute insanity, and especially acute mania, may be cured in from two to four weeks by this method. The essentially calming and sedative action of these baths is demonstrated by their influence on the circulation and the respiration, the absorption of a large quantity of water into the system, and the gradual and general cooling which they produce. 3. The duration of the baths should, in general, be from ten to twelve hours; they may be prolonged to fifteen or eighteen hours. 4. This treatment may improve, but does not cure, chronic mania.1

As the shower-bath and the douche are both of them repugnant to almost all patients, they become powerful means of moral treatment in the hands of a judicious physician, if they are prescribed, not as punishments, but with the distinct announcement that they have the power of removing the delusion, hallucination, or state of mind which causes the patient to act contrary to the settled laws of truth. To use them for punishment is to degrade a wholesome and kindly discipline into an instrument of torture. The cold bath and the douche are also very efficient remedies for the sleeplessness which is so common in the active forms of insanity.

Delirium Tremens. Cold affusions on the head have been recommended by many authorities for this disease, particularly if the body of the patient is at the same time immersed in a warm bath. Armstrong used them with greater boldness. When the patient was robust and in the first stage of the attack, he caused several gallons of cold salt water to be dashed over his body. But he confined its use to patients who had much constitutional vigor, and both before and after its application gave them warm wine and water to drink, and followed the douche by active frictions of the skin with warm flannels. Without doubt there are instances of the more violent and maniacal form of the disease (mania-à-potu) occurring in robust patients, which have been wisely and safely treated by this heroic method; but it cannot be generally applicable even to the more violent cases. That the tepid bath with cold affusions to the head is safer and more effectual cannot,

¹ Jour. of Psychological Medicine, i. 456.

² Comp. Leurer, Traitement Moral de la Folie, p. 156.

BLAKE, Pract. Essay on Delirium Tremens, p. 88.

⁴ Pract. Illustrations, ed. cit., p. 268.

it is believed, be doubted. Old and broken-down drunkards cannot bear the sedation even of this mode of applying cold, and, indeed, in

any form it should rather be avoided in treating them.

In poisoning by narcotics there is no remedy more important than cold affusions. Applied to the head, they may be repeated frequently, but they cannot be so often renewed to the rest of the body; for, although the shock which they cause is of the highest utility in arousing the torpid functions, yet their frequent repetition lowers the temperature of the body too much, and rather hastens than impedes the progress of coma. Two cases of poisoning by opium, and one by belladonna, are reported by Dr. A. R. Jackson, in all of which the prompt and salutary influence of cold water poured upon the head is illustrated. No other remedy contributed to remove the profound narcotism.

Chorea. Many years ago, Dupuytren drew attention to the value of cold affusions in this disease. He directed the patient to be plunged into a cold bath and rapidly withdrawn as often as five or six times in the course of a quarter of an hour; or sometimes he preferred simple affusions of cold water, after which the patient was made to take active exercise for a few minutes, and was then covered up warmly in bed. Dupuytren maintained the infallibility of this method, and cases of its success are reported by Hospital. Biett gave a preference to the shower-bath, and asserted that he had cured severe cases of chorea in eight or ten days by the use of this means exclusively. Constant found cold baths (65°), continued for an hour at a time, with the use in some cases of cold affusions to the head, very successful in the same disease. Rilliet and Barthez do not furnish as favorable an account of the results obtained by them from the cold bath.

There can, however, be no doubt of its efficacy; almost every practitioner can testify in its favor; but it must nevertheless be used circumspectly, and so as not to excite either dread or alarm. Hence it is a measure but seldom applicable to very feeble and excitable children, and is rarely proper in the winter season. Apart from these and similar exceptions, cold baths, and particularly cold affusions and the shower bath, are among the most valuable means of treating chorea. They are sometimes curative even when used alone, but they are much more generally to be recommended as adjuvants to internal re-

medies.

Hysteria. Cold has no especial application in this disease beyond that of diminishing the congestion of the head which sometimes exists during the paroxysms, but it may become a valuable addition to the other means employed in the intervals of the attack for the purpose of preventing local determinations of blood, and of reducing the morbid susceptibility of the system. When attacks of hysteria simulate death, as they occasionally do, the sudden application of cold to the surface of the body will revive the signs of life. Closely allied to hysteria is the melancholy disease nymphomania, for which no remedy is more

¹ Am. Jour. of Med. Sci., July, 1859, p. 74.

Bull. de Thérap., vi. 206.

⁴ Ibid., viii. 333.

² Archives Gén., xxiv. 130.

⁴ Ibid., vi 300.

Mal. des Enf., ii. 319.

ice. Dr. B. D. Carpenter states that he cured fifteen out of sixteen cases of this affection by means of ice contained in bladders and kept steadily applied to the spine.¹

The spasmodic symptoms, attended with high arterial excitement produced by drinking very cold water or alcoholic mixtures, in hot weather, are speedily relieved by cold affusions to the head, and cold drinks.²

Diseases of the Digestive Organs.—Constipation. The ancient practice of promoting alvine evacuations by applying cold to the feet, is illustrated by the following case of Hippocrates.3 A stout, healthy woman, who had taken some emmenagogue medicine, was seized with a violent pain in the abdomen, which grew much distended; she vomited blood, and became to all appearance lifeless. About thirty vessels of water were dashed over her, which procured free bilious evacuations, and the patient recovered. A certain Duke of Ferrara was subject to constipation, and could obtain relief only by walking upon the marble pavement of his chamber when he arose in the morning. Cullen observes that when every purgative has failed in this disorder, the action of the intestines may be effectually excited by throwing cold water on the extremities. An instance of this sort is related by Stevenson. One also is reported by Vaidy, of a patient who for twenty days had suffered from obstinate constipation, which repeated doses of purgative medicine did not relieve. A tumor as large as a man's head could be felt in the hypogastrium. As a last resort, the patient was directed to walk barefoot upon wet flagstones, and compresses wet with iced water were applied to the abdomen. Very soon afterwards an evacuation took place of liquid, and then of solid fæces, and the tumor disappeared. Two very interesting cases of a similar character were reported by Dr. Spence, who caused the patients to stand on a cold, wet, brick floor, while cold water was dashed upon the lower extremities as high as the hips. Still another is related by Falconer, in which a lady who was reduced to the last extremity by the long retention of her fæces, and the active measures employed to relieve her, at last obtained an evacuation under the influence of cold affusions upon her hands and legs. In 1791, Dr. Bartram, of South Carolina, used the same method, with the addition of swathing the abdomen "in cloth dripping wet with cold water," in a case of obstinate constipation, with abdominal distension and pain, constant vomiting, and a quick, small pulse. All other means having failed, those mentioned were employed with prompt and complete relief.* An analogous but still more desperate case, in which the constipation had resisted every internal remedy for fifteen days, was relieved in the same manner by Mr. Kite. Whitehead of relates a case in which a prodigious quantity of purgative medicines and clysters had been used to no purpose. The patient was

N. Y. Jour. of Med., Jan. 1860, p. 133.

² S. Jackson, N. A. Med. and Surg. Journ., ii. 250.

^{*} Epidem., v. xviii.

4 Edinb. Ess. and Obs., vi. 556, 568.

Dict. en 60 vol., xviii. 414. Trans. Lond. Coll. Phys., iii. 96.

⁷ Mem. Lond. Med. Soc., ii. 73. Trans. Coll. Phys. of Phil., i. 203.

⁹ His Essays and Observations, Lond. 1795. ¹⁰ Lond. Med. Gaz., 1841, i. 58.

an old man, and was rapidly sinking. As a last resort, cloths dipped in ice-cold water were suddenly and unexpectedly applied to the abdomen. Immediately its distension began to subside, an evacuation of hard, dry fæces took place, and the patient recovered. A draught of cold water before breakfast is an excellent palliative of habitual

constipation.

The advantages of modern hydriatry are more clearly illustrated in the treatment of abdominal affections, and especially of habitual constipation, than of any other disease. So large a proportion of the chronic diseases of the digestive organs arise from over-eating and sedentary occupations, that the cultivation of simpler and more rational habits of life forms the first step towards their cure; yet it is one which very few patients will consent to take so long as they remain at home. But the discipline and the novel impressions of a sanitary establishment, together with the faith which men are prone to place in what is strange, go very far to bring about cures which had been impossible under the dominion of cherished and long indulged habits of unwholesome living. It is, however, no more than just to observe that the systematic use of bathing, frictions, sweatings, exercise, &c., as enjoined in water-cure establishments, contributes largely to their success in cases really adapted to such discipline. The daily use of the wet sheet followed by a cold bath and active frictions of the whole surface of the body, the cold hip-bath, the constant use of the stimulating compress to the abdomen, occasional cold enemata, frequent and copious draughts of pure cold water, together with a simple diet, of which milk and brown bread form a considerable part, these and active exercise constitute the means by which the most confirmed torpor of the bowels has been overcome in numberless cases for which the entire catalogue of drugs had been able to furnish no permanent nor perfect cure. When constipation is connected with disorder of the stomach, with atony, or with excessive irritability of this organ, the means just pointed out, when adapted to the vigor of the patient, are probably more effectual than any others that can be employed. In such cases the failure both of medicinal and merely dietetic remedies is only too familiar to physicians. Instances are not wanting of habitual vomiting after eating, with obstinate constipation and progressive emaciation, which have been cured by the hydriatric method, after the failure of the best devised medicinal treatment. As a sedative of deranged nervous action, a stimulant to the skin, a revulsive to the digestive organs, and indirectly as a tonic to the whole system, cold acts more powerfully and usefully in these cases, while the stomach is spared the injury of the direct contact of purgative drugs. In the class of cases alluded to, the radical morbid element destroyed or removed by cold is undoubtedly want of tone, and this sometimes is, if not usually, combined with gastric irritability. There are certain examples of chronic diarrhæa in which this combination of morbid clements is present, and these may doubtless be materially benefited by the united tonic and revulsive influence of cold water. Where there is reason to believe that the flux depends upon an ulcerated state of the intestine, the employment of this remedy is at least of questionable propriety. It is certainly inferior to many agents of the materia medica.

In Surgery.—Contusions, &c. Cold water is at once the simplest and the best application for bruises, or for that general soreness which results from a fall or other direct violence. The first application should be tempered, but the subsequent ones consist of cool water, followed by frictions to the skin, and the bruised parts should afterwards be covered with wet compresses. After the reduction of dislocations the affected joints should be enveloped in moist compresses, to prevent reaction, effusion, and consequent stiffness. Should, however, this result have already taken place, then the cold douche, followed by frictions, is more likely than any other treatment to restore liberty of motion to the joint. The use of cold affusions, or of wet compresses, is not less serviceable after injuries or fractures in the neighborhood of joints, in order to prevent inflammation. The same may be said of sprains, which, indeed, often involve laceration of the articular ligaments. Bidou, who has written upon these injuries, maintains that when cold water is opportunely applied, the patient will recover the use of the limb in one-third of the time required by other methods. He recommends that the foot and ankle should be plunged into cold water, and allowed to remain there for two or three hours, the water meanwhile being kept at its original temperature. At the end of this time wet compresses may be substituted for the foot-bath, and continually renewed until the danger of inflammatory reaction is past. Some very interesting cases have been reported by Dr. Tillet, of Lancaster, Pa., which illustrate the present subject in a striking manner. Among them is one of a physician who suffered fracture of an anchylosed knee. The patient was extremely corpulent, weighing upwards of three hundred pounds, and the leg became violently inflamed. During three weeks cold water was poured upon the knee every five or ten minutes, and subsequently at longer intervals, and the pain and swelling were effectually kept under by its means. So violent were the local symptoms, that no other treatment would probably have saved the limb.

Wounds. One of the first persons in Great Britain to follow the advice of Macartney relative to water-dressings was MacFadzen, who had observed that in the lower animals inflammation was not necessary to the healing of wounds. He also found that under this method they healed neither through the medium of blood, lymph, or pus, but by a contracting process from the bottom of the wound upward. He applied compresses of lint, wet with cold water, and covered with oiled silk, three times a day. Beaupré, Josse, and others spoke very emphatically in praise of this treatment, and the latter proposed and extensively employed the method of continuous irrigation. It was afterwards adopted by Bérard. He made use of siphons, of small diameter, to conduct the water to the affected part, which was covered with a single thickness of linen, and rested upon

¹ Bull. de Thérap., i. 243.

² N. Am. Med. and Surg. Jour., v. 58.

<sup>Edinb. Med. and Surg. Jour., 1830, xxxiii. 84.
Archiv. Gén. de Méd., 2ème sér., viii. 399.</sup>

⁵ Ibid., vii. 1; and 2ème sér., xiii. 343.

cure as to be persuaded that a charm had been used.' And no doubt the persevering use of cold water to such local inflammations would in a great majority of instances arrest their development completely. That most painful, and indeed serious, affection—for it may disable the hand upon which a man depends for daily bread—whitlow, may almost always be summarily arrested by holding the finger for several hours in ice-water. Mr. Curling has treated several cases of acute orchitis successfully by the application of ice. It speedily relieved the pain, and effected an unusually rapid cure. Ulcers in various conditions are most beneficially treated by water-dressings. One of the earliest allusions to the efficacy of water in these affections was made by Smith,3 who speaks of an extensive ulcer caused by molten brass running over the leg, and which was finally cured by the patient, who was fond of fishing, having stood for several hours at a time in a running stream. As early as 1813 we find a Mr. Johnson reporting the remarkable success he had met with in treating indolent ulcers by sea-water only. As generally happens, so in this case, a theoretical objection opposed the general acceptance of the improved treatment. It had grown into an article of faith that cold was hostile to the reparative process, and consequently the evidence which demonstrated its salutary influence was unheeded or disbelieved. But the power of truth ultimately overcame disbelief. Percy and others demonstrated that nothing was more conducive to the healing of indolent and flabby ulcerations than the cold douche, and nothing more likely to counteract the tendency to inflammation and extension of active ulcers than the permanent application of cold water dressings. In those ill-conditioned sores that spread by gangrene, or in consequence of the low vitality of the parts they affect, nothing effects a change for the better so soon as water, applied at a temperature adapted to the sensibility of the patient and of the affected part. Butzke was very successful in curing atonic ulcers of the feet by the cold douche, continued for an hour or more at a time. The first effect of the remedy was severe pain, which made it necessary to render the application very brief; but this was followed by a deep redness of the skin near the ulcer, with some bleeding from its surface, an itching sensation, increased heat and swelling of the part, and a larger discharge of pus, demonstrating the stimulant effects of the remedy. After its application in the manner described, the part was wiped dry, covered with charpie, and bandaged.

Burns and scalds have been very successfully treated by cold water. As early as the middle of the last century, Godfrey cured burns by immersing the injured part in cold water for several hours. In 1806, Dr. McDowell, of York, Pa., reported two cases of severe scald of the feet and legs which were treated by immersion in cold water, with the effect of speedily relieving the pain, and causing the skin to heal very

¹ Edinb. Med. and Surg. Jour., xxx. 84.

² Times and Gaz., Feb. 1855, pp. 210, 233.

⁵ London Med. Gaz., N. S., 1839, i. 893.

Edinb. Med. Essays, 3d ed., vol. v., Pt. ii., p. 414.

Writers upon this subject draw a just distinction, in reference to the advantage of cold, between strangulations caused by distension and those produced by inflammation. The former are relieved readily and effectually by the brief action of a low degree of cold, but when the protruded parts are attacked with inflammation it is more prudent that the temperature of the application should be moderate and maintained for a longer time, because the tissues to be acted upon are denser and less mobile than in the previous case, and do not, therefore, contract so readily under the action of cold. Still, there are cases in which, although inflammatory symptoms had set in, the free and prolonged application of pounded ice was followed by relief. In one, peritonitis, following the operation for strangulated femoral hernia, was arrested by the persevering use of this remedy. Ice and other means of producing cold were used by Sir Astley Cooper to promote the reduction of hernia; the former has been successfully employed by Mr. Le Gros Clark, and no less than nine cases have been published by M. Baudens to demonstrate its efficacy when conjoined with graduated compression.3

Anchylosis. The stiffness which continues to affect joints after prolonged rest and after idiopathic or traumatic inflammation is more effectually removed by cold affusions than by any other single means. They should be managed so as to stimulate the affected parts, and their use should be combined with frictions and passive motion. Indeed, they serve admirably to prevent the injurious effects which the last-named manœuvre occasions when too vigorously performed. In hysterical rigidity of the joints the cold douche has also been suc-

cessfully employed.

Vascular Distensions. It has been proposed to cure superficial aneurisms by a constant application of ice. Cases of success in the early stage of the disease are recorded by Guérin, Pelletan, and Böe. The palliative use of this remedy in dilatation of the hæmorrhoidal veins is well known, and Chrestien reports a case in which the application of cold to the penis enabled him to introduce a catheter, the entrance of which had been prevented by a varicose condition of the veins of the urethra. Repeated irrigations of cold water are sometimes of immense advantage in reducing the engorged and ulcerated neck of the uterus to a normal condition, and thus indirectly of curing its displacements. M. Aran attributes great advantages to this method, to which, also, he adds the introduction of pieces of ice into the vagina by means of the speculum.

Cold as an Anæsthetic. Beaupré relates that a soldier whose leg had been amputated suffered excruciating pain in the stump, which neither opiates nor any other means relieved, until compresses wet with cold water were applied, when the pain ceased at once as if by enchantment.* Dr. Arnott, whose original suggestion of a mode for

¹ Bull. de Thérap., l. 472.

² Lancet, March, 1855, p. 238.

^{*} Efficacite de la Glace combinée à la Compression, &c., Paris, 1854.

⁴ Fleury, Archives Gén., 4ème sér., xvii. 317.

Braupré, op. cit., 380. FAURE, Archives Gén., 5ème sér., i. 551.

⁷ Bull. de Thérap., li. 258.
⁸ Op. cit., p. 211.

tumor was removed from the arm, requiring a double elliptical incision extending from the acromion process to within three inches of the elbow. The frigorific application consisted of ice and salt; the adipose layer was frozen so hard as to cut like tallow, and the patient experienced so little pain that he suffered more from the dressing of the wound than during the operation itself.¹

It is claimed by Dr. Arnott for this method that parts which are incised while congealed heal more rapidly than under ordinary circumstances; that, indeed, it tends to prevent traumatic inflammation, while it restrains hemorrhage, and disposes the wounded parts to unite by the first intention. If the skin is merely benumbed, no redness follows the application, and if congelation of the subcutaneous adipose layer takes place, redness of the part follows, and may continue for a day or two, but a true inflammatory condition does not result.

An attempt was early made by Velpeau, as well as by Dr. Arnott, to prevent the growth of cancer by congelation. It was, even earlier, argued by Prof. Bennett that a temperature low enough to arrest the progress of a parasitic growth might not be injurious to the sound structures around it, if it were not too long maintained. For some time the treatment was thought to be successful; in several instances it evidently suspended the growth of the cancerous tumor, and palliated the sufferings of the patient in a remarkable manner. But we cannot learn that the success of the treatment has been decided.

Dr. Arnott has made use of the frigorific mixture in a variety of local affections of an inflammatory or only painful character. The following are the most important of them: lumbago, chronic and acute rheumatism, sciatica, rheumatic gout, erysipelas, eczema, painful nodes, sprains, contusions, headache, neuralgia, toothache, and mercurial sore mouth.

The method recommended by Dr. A. in the application of intense cold is the following: If the congelation is not to be extensive or long continued, a piece of ice of the size of a large orange will be This is well pounded in a coarse cloth or bag, and the powder being placed upon a large sheet of paper, is thoroughly mixed, by means of a paper-folder, with about half its weight of The mixture is then put into a net of about four common salt. inches diameter, and as soon as it begins to dissolve it is ready to be applied. The net is not kept motionless on the part, but is frequently raised in order that fresh particles of the mixture may be brought into contact with the skin, and the water that escapes from it may be absorbed by a sponge, or allowed to fall into a basin placed underneath. If the surface to be acted upon is of small extent, a very thin and large copper spoon containing the mixture, or a solid brass ball of about a pound weight, which has been immersed in ice and salt will often answer, and is neater than the net.

The moment a gauze net, or a thin metallic vessel containing a

¹ Am. Jour. of Med. Sci., July. 1855, p. 279.
² Month. Jour. of Med. Sci., July, 1854, p. 34.

are almost equally objectionable whenever there is extreme debility connected with a local morbid action tending to disorganization.

The rude treatment at first employed by Priessnitz was the natural result of his having learned the system by experiments, at first upon quadrupeds, and afterwards upon hardy Silesian boors, but he was obliged to modify its harshness when his patients were recruited among courtly sybarites and other luxurious denizens of towns. restrained the sweating and douching practices within narrower limits when he had learned the dangers and mischiefs of their indiscriminate Not a few cases were reported of sudden death following his original discipline; very many examples of insanity were among its consequences; organic diseases of the heart were attributed to it; and it was said habitually to depress the animal temperature, and, after having been used for some time, to increase very much the susceptibility to catching cold. A portion of these results may be ascribed to the impoverishment of the blood which has been observed to follow the hydropathic regimen, and in those especially who drink large quantities of water. The symptoms were in the main those of scurvy, viz.: pallor of the integuments, cedema of the face and ankles, a frequent pulse; palpitation of the heart, pale and fetid urine, ulcers of the mouth, and a disposition of all wounds to bleed profusely. We believe that we have seen pulmonary consumption developed by an excessive addiction to the watery regimen. These facts furnish a weighty objection to the method in question as it was originally, or is even now practised, by the speculators in its use; but, as they relate almost exclusively to results which followed a protracted application of the system, they ought not to be permitted to prevent its judicious employment by capable and conscientious physicians.

ADMINISTRATION.—The modes of employing cold in medicine may be conveniently arranged under the following heads: 1. The simple application of cold by means of baths, irrigations, epithems, and of a low temperature without liquid; 2. Cold, with mechanical stimulation of the skin, e. g., ablution, affusion, the douche, and the shower-bath;

3. Cold so applied as to stimulate the skin permanently.

Cold Baths.—It is not easy to indicate very narrow limits of temperature within which a bath may be called cold. At almost any temperature under 70° F. a bath will produce a distinct sensation of coldness, but it has been usual to describe as cold, a bath between 33° and 60° F., and one between the latter temperature and 70° F. as cool. The common and safter practice is to begin with the cool, and proceed gradually to the cold bath. Natural baths, however, may be used at a much lower temperature than those prepared at home. Neither should be used immediately after a meal, and seldom within four hours after a full repast. The skin should be moderately warm, and the mind cheerful. Hence a certain amount of exercise before bathing is beneficial. It renders the impression of cold water more agreeable, and the subsequent reaction more complete. For this reason, doubtless, the bath taken at noon in summer is the most grateful. The

¹ MITSCHERLICH, op. cit., i. 421.

When it is intended that the impression of cold shall be protracted, the application must be constantly renewed, as in cases of cerebral excitement. A degree of cold greater than that produced by cold water or pounded ice may be obtained by the use of artificial mixtures, such as the following: R.—Potass. nitrat. 3ss; ammoniæ muriat. gr. cxx; aceti f3iss; aquæ f3xx. The anæsthetic applications of freezing mixtures have been described in this article. More generally the antiphlogistic effect is sought, not so much from the primary or transient, or even the more lasting impression of cold, as from the emollient and more durable influence of the moisture. For this purpose wet compresses, covered with a larger piece of oiled silk or some other impermeable tissue, may be employed. Care must be taken to wet the compresses afresh as often as they become dry.

Ablution consists in applying cold water, with more or less friction, to the surface of the body. In addition to the direct impression of the cold fluid, the sense of coolness is prolonged by its evaporation. It is one of the most useful and grateful palliatives which can be employed in fevers attended with a hot and dry skin, and may be resorted to when the disease itself, or the age, weakness, or timidity of the patient renders more energetic antiphlogistics inappropriate. A more active form of ablution consists in rubbing the skin with cold water and the hand, while the patient sits in a bath-tub half full of water. It should last from five to ten minutes, and be followed by a speedy and complete reaction. A cold foot-bath in which friction is performed by the feet upon one another, is an excellent means of preventing cold feet

and relieving headache in feeble and excitable persons.

Affusion.—Jackson thus describes the manner in which he employed cold affusions for typhus in 1794: "The patient was in the first place washed and made perfectly clean by means of soap and water; the skin was rubbed strongly, and under the state of susceptibility and artificial animation consequent to friction, cold water (which was sometimes at a temperature but little above the freezing point) was poured upon the head and shoulders and other parts of the body from a bucket, or it was applied by means of sponges in such manner as to imitate a shower-bath." Currie lays down nearly similar rules, and they are further confirmed by the authority of Armstrong. The two last-named writers, however, do not seem to attach so much importance to the preparation of the patient by washing with soap and water. Yet it is a measure which must exert a powerful influence on the subsequent action of the affusion, and there is good ground for its prescription, if it were only because the ancients employed such alternate impressions of heat and cold, and because they are to this day in vogue among the Asiatics and the eastern nations of Europe.

Jackson pointed out very clearly that merely to abstract heat is not to cure fever, and that therefore the modus operandi of cold affusions includes other elements than this. We are rather to look for an explanation of their salutary action in fever in the double movement, first of depression, and then of reaction, which they produce. This

¹ An Exposition, &c., p. 19.

Shower Bath.—The shower bath is a modification of the douche, and is formed by water passing through a plate perforated with numerous small holes. It is generally described as being less powerful than the douche, but it so envelops the bather as to take away his breath, and its shock, if less powerful, is also less concentrated, and is therefore borne by a larger surface of the body at once. "It gives a thousand little blows which vex by their minuteness and bewilder by their number." It is nevertheless preferable to the douche when a comparatively gentle stimulus is required, on account either of the age or the feebleness of the patient.

Hydropathic Measures.—Sweating, produced by enveloping the body in dry blankets, and administering cold drinks, although generally described as a part of the hydropathic treatment, was in reality very little used by Priessnitz, and does not belong to the general subject of this article. It consisted, however, in endeavoring to produce active diaphoresis by sweating the patient in blankets, and carefully adjusting them about the neck, so as to prevent, as nearly as possible, all escape of heat from the skin. The head meanwhile was kept cool by wet compresses, and, when once sweating began, small quantities of cold drinks were administered every few minutes. The desired effect

was frequently not produced for several hours.

Packing in the Wet Sheet.—This is the most useful and efficient of the processes employed. A large and coarse sheet is thoroughly wrung out of cold water and spread over a blanket previously extended upon the bedstead. The patient lies at full length in the middle of the sheet, which is at once closely and thoroughly wrapped around him, and the blanket is applied over it in the same manner. A feather bed, or a down covering, is laid over all. This is a very powerful process, and deserves to be withdrawn from the hands of the charlatans who have converted it into a deadly weapon. Its first impression on persons in feeble, or even ordinary, health, is one of disagreeable coldness, but this soon passes away, and is followed by a mild and grateful warmth. The temperature of the skin gradually rises until it feels hot, the face becomes injected, and general perspiration breaks out, which, if desirable, can be maintained by repeatedly administering small draughts of cold water. When complete reaction has taken place the wrappings are removed, and the body is washed with cold water, or the patient plunges at once into the cold bath. This, at least, is the regimen in chronic diseases. In acute affections, the sedative action of cold is rather sought for, and as soon as reaction manifests itself, fresh wrappings are applied, and the process is repeated until the pulse is permanently lowered.

The stimulant or sedative effects (for they may be either) of the wet sheet are obtained upon a small scale, and, locally, by means of wet compresses. When these are saturated with water, and frequently renewed, they act as refrigerants, and diminish the quantity of blood in the part to which they are applied; but if allowed to remain longer in place they are simply emollient. The so-called hydropathic belt consists of a bandage, five or six inches in diameter, and long enough to go twice or thrice around the body. After having been dipped into

Anhydrous hydrocyanic acid is a clear, transparent liquid, which is extremely volatile, and freezes by its own evaporation at 5° F. Its boiling point is 80° F. Light readily decomposes it and renders it yellow or brown. Its taste is at first cool and afterwards burning; its odor resembles that of bitter almonds, and is irritating to the nostrils. Its vapor is inflammable, and burns with a reddish-yellow flame. Its acid reaction is very feeble, as it reddens litmus very slightly. It is partially soluble in water, but perfectly so in alcohol, ether, and the ethereal oils.

HISTORY.—The well-known pigment, Prussian blue, was discovered by Diesbach and Dippel at Berlin in 1704. Nearly half a century later, Macquer found that alkalies decomposed and decolorized Prussian blue; and in 1775, Bergmann announced that the coloring principle of this compound was an acid. Scheele was the first to isolate this substance. In 1782, he demonstrated its properties, and pointed out new and more perfect methods of preparing it, but it was not until 1815 that the acid was obtained in a pure and anhydrous state, by

Gay Lussac, who also gave the name cyanogen to its radical.

Hydrocyanic acid exists naturally in numerous plants. It has been obtained from the leaves, flowers, and kernels of peaches, cherries, plums, and bitter almonds, from the leaves of the cherry-laurel, the bark of the wild cherry (Prunus Virginiana), &c. In some of these it does not exist already formed by nature, a statement which would seem scarcely reconcilable with their well-known poisonous qualities, when taken in substance, although the fact is attested by ancient authorities and made familiar by modern experience, had not science proved in what manner the poison is developed out of the elements furnished by the plants on the one hand, and the animal economy on the other. Dioscorides mentions that bitter almonds are poisonous to foxes and other animals, and even to men, when eaten in large quantities, and his statements are fully confirmed by Matthiolus, Wepfer, and others.1 It would appear also that this substance, or, as some suppose, its radical, is, under certain circumstances, a product of the animal economy. Fourcroy relates that "a woman, aged about thirty years, labored under a nervous and melancholic affection in consequence of protracted grief. The principal seat of her suffering was in the epigastric region. She became exceedingly emaciated, and had hectio fever, with a livid paleness of the skin. After a few days she was seized with a convulsive trembling and faintings, which were followed by the discharge of drops of blood from the edge of the eyelids, the nostrils, and the ears. The linen with which the blood was wiped off was marked with spots of a beautiful blue." A similar case is given by Coulton, in which pus from the wound of an extirpated cancer continued during five days to tinge the linen of a fine blue color.3 Dr. Pereira met with a very analogous instance. Dr. Batt, of Genoa, found in the urine of a little girl, of seven years of age, a dark blue sediment, which proved on analysis to be prussiate of iron. Numer-

¹ WIBMER, Wirkung, &c., i. 154.

Ibid.

² Am. Med. Recorder, ii. 516.

⁴ Sigmond, Lancet, 1836-7, ii. 745.

The acid soon disappears, being either decomposed or absorbed; for a few hours after the experiment, no smell of it was perceptible."

On Animals.—Hydrocyanic acid is poisonous to all animals, but acts rather less rapidly upon the cold than upon the warm blooded. Shrader, of Berlin, in 1802, was the first to illustrate its terrible power, which the experiments of Emmert, Coullon, Schubarth, Magendie, Londsdale, and Nunneley have amply confirmed. When the effects produced by a dose of hydrocyanic acid are not too rapid to be observed, the earliest appears to be giddiness, with a loss of muscular power and control over the combined action of the muscles; the head droops, the mouth gapes, the tongue protrudes, there is apparently a sense of distress and constriction in the fauces, and the respiration is hurried and panting. This unsteadiness and loss of power are speedily succeeded by spasm, frequently of the most intense kind. It may be either tonic or clonic, according to the strength of the dose of acid, and the susceptibility of the animal. If the spasm be tonic, not only do the voluntary muscles continue rigid, but the heart is, at least to the same extent, involved. It ceases to pulsate, and the respiratory muscles are affected with spasm. Hence the lividity and bloated appearance of the face, the protrusion of the eyes, and the excessive congestion of the veins. In this condition of the two all important functions is to be seen one of the causes of the almost instantaneous death which takes place in some instances. When, however, the dose of the acid is less, or the susceptibility of the animal not so great, the rigidity of the muscles soon abates and gives way, and is followed by more or less complete paralysis; at the same time the respiration either becomes excessively rapid, the chest being but little expanded, or it is very slowly performed, and is deep or sighing. The heart beats very rapidly and feebly. This state of paralysis may continue, the weakness gradually increasing until the animal dies, or, as more generally occurs, the creature is convulsed and paralyzed at intervals, the heart continuing to beat very feebly for two or three minutes after all signs of sensation and motion have ceased; though, by no means infrequently, a strong convulsion immediately precedes death. If the animal recovers, it will often lie in a complete state of paralysis; but after a time slight convulsive movements of the limbs, or some spasmodic action in respiration may be observed. These gradually grow stronger, until the convulsions often become very powerful. The animal howls loudly, reflex action returns, and subsequently, sensation. But for some time it continues very feeble, is indisposed to move, and has very little command over its muscles. If it survives, the symptoms resemble those from opium in the deep, quiet sleep, and indisposition to be aroused from it, while the condition of the pupil is variable, being often, at this stage, by no means dilated. The acid acts locally as well as generally. When dropped into one eye of an animal, the pupil of the eye is sooner, and to a greater extent, dilated than that of the other; and when the acid is administered by the rectum or the vagina, both hind legs are sooner affected than the anterior portion of the body. But the constitutional symptoms appear almost as rapidly as if the poison had been swal-

lowed. Much has been said of the shriek which often precedes death from hydrocyanic acid. It is by no means a constant occurrence, but, when it does take place, the cry is of so peculiar a kind, and so indicative of severe distress, as to give the idea of consciousness of impending death on the part of the animal. Post mortem examinations, whether made immediately after life has ceased, or some time afterwards, do not throw any very decided light upon the cause of death. But if the body be opened while the heart is pulsating, it will be found that when death has been long delayed, or the dose of acid very small, the blood is usually dark in color, alike on both sides of the heart, and all the cavities of the viscus may contain more or less of it, especially the right, which is often much distended; while, on the contrary, if the death has been sudden, in almost every case the left side of the heart, and especially the ventricle, is found to be perfectly empty and rigidly contracted, while the right side of the heart contains blood, being in some cases, though by no means always, much distended. The stomach, or whatever part the acid had been applied to, is almost invariably found reddened. The veins of the brain, and indeed throughout the body, are remarkably engorged. Cadaveric rigidity is probably greater after death from hydrocyanic acid than after death from other causes. Kölliker concluded from his experiments upon frogs that prussic acid directly and primarily produces cerebral paralysis, and then affects the spinal marrow, destroying, first its reflex, and afterwards its direct motory function; and that it paralyzes the heart, and permits it to become distended with blood.1

There is no fixed quantity of the acid which will invariably destroy life. The more vigorous the animal, cæteris paribus, the larger is the quantity that may be taken. In like manner, a smaller dose is fatal in young animals than in the old, although in very young animals large doses are required. The degree of concentration of the acid has no very material influence over its action. Given on successive days, hydrocyanic acid does not show a cumulative action, but rather the reverse; it is more probable that the system becomes habituated to it, and by repetition will endure a dose which, if given at first, would have been destructive to life. It was curious to observe, says Mr. Nunneley, that however helpless and paralyzed a dog might be lying, if another dose were given, the first and immediate effect of it was to rouse the animal, and often to produce violent motion.²

When introduced by the rectum or vagina, or applied to wounds or to the conjunctiva, hydrocyanic acid occasions the same series of symptoms which have been described, but more gradually. Injected into the veins it may destroy life instantaneously, and when inhaled in a concentrated state it is scarcely less immediately fatal.

On Man.—The phenomena occasioned in man by hydrocyanic acid may be conveniently studied under three heads: the effects, 1st, of small or medicinal doses. 2d, of those which are poisonous, but not

VIRCHOW'S Archiv, x. 288.
 VOL. 11 — 14

immediately, if at all fatal. 3d, of those which are directly destructive of life.

Under the first head may be mentioned irritation of the throat and windpipe, an increased flow of saliva, a sense of heat in the epigastrium, diffusing itself over the whole abdomen, and even to the entire surface, constriction and heaviness of the head, dizziness, buzzing in the ears, headache, numbness, duskiness of the countenance, staggering, laborious respiration, constriction of the chest, often palpitation of the heart, inclination to vomit, but sometimes a feeling of emptiness in the stomach, and craving for food, a quick and excited, or an unusually slow pulse, and, for some hours after these symptoms, a sense of weariness and an inclination to sleep. These phenomena occur more readily in feeble than in robust persons.¹

Examples of the second class are seldom met with; for when much more than the due medicinal dose of the acid is taken, either by accident or design, it almost always proves rapidly fatal. The following, which are the symptoms that occurred in the case of Dr. Bertin, of Rennes, may serve to illustrate this class. Dr. B. had already more than once taken a dessertspoonful of the medicinal acid without injury, and on the present occasion procured from an apothecary a like dose of the medicine prepared by one of the best chemists of Paris, and swallowed it in two mouthfuls, before leaving the shop. Almost immediately afterwards he fell down as if struck by lightning. His symptoms were the following: loss of consciousness and sensibility; trismus; a constantly increasing dyspnœa; cold extremities; a noisy and rattling respiration; the characteristic odor of the acid upon the breath; distorsion of the mouth; and a thready pulse. The face was swollen and dusky, and the pupils fixed and dilated. The trismus increased, and was soon accompanied by opisthotonos. At the end of an hour a violent convulsion came on, the whole trunk grew stiff, and the arms were twisted outwards. The convulsive attacks were repeated, but did not last more than a few minutes. The abdomen was distended with flatus, and continued to enlarge. After two hours passed in this condition, the patient began to regain his consciousness, said that he had taken prussic acid, and begged that he might have more air, and be allowed to die in peace. The mind gradually became clear, but there was marked dyspnœa, and from time to time a fit of coughing which caused the expectoration of a little opaque, whitish mucus. There was no paralysis whatever. About nine hours after the accident the patient was taken home, and walked up stairs to the second story without assistance. For several days he experienced the symptoms of a pulmonary catarrh, which may have been unconnected with the poisoning; his urine was scanty, and he complained of a sense of stricture across the chest. He was not able, for a fortnight after the accident, to leave the house.

In the third series of cases death may take place without being preceded by any definite symptoms. MM. Trousseau and Pidoux say:

Revue Méd., xvii. 265.

^{&#}x27; Compare Becquerel, Gazette Méd. de Paris, 1840, No. 1 et seq.

not prevent the instantaneous and fatal effects of the poison introduced into a wound of the lower extremity. The demonstration is, moreover, direct and clear of the bloodvessels being the channel through which the poison acts. For if it is introduced into a limb in which the circulation is suspended by a band firmly applied, no constitutional effects whatever take place until the pressure is removed, but immediately the reaction the size of poisoning display the reaction.

diately thereafter the signs of poisoning display themselves.

REMEDIAL EMPLOYMENT.—MM. Trousseau and Pidoux, on reviewing the evidence in favor of hydrocyanic acid as a medicine, arrive at the conclusion that "it is often dangerous, almost always useless, and very rarely curative." This judgment is scarcely impartial. Undoubtedly a great many of the expectations which were indulged of the usefulness of the medicine have, as in the case of nearly all new agents, been disappointed; but a fate which befalls the good and the worthless alike ought not to be made a ground of condemning the former. From the following summary it will be perceived that the medicine has just claim to confidence in the treatment of several diseases.

Spasmodic and Painful Diseases.—Whooping-cough. In no other affection has the value of this medicine been more highly exalted, and there is apparently some ground for a favorable opinion of its merits. Dr. E. P. Atlee' prescribed it for children and adults in more than two hundred cases of the disease, which it cured in from four to ten days, or at furthest in a fortnight. He employed a preparation containing four and a half per cent. of the pure acid, of which five drops were mixed with an ounce of syrup, and of this mixture a teaspoonful was given three or four times a day to a child from six to twelve years of age. Dr. Hayward' found, in the latter stages, when there is little or no mucus in the lungs, nor any tendency to congestion of these organs, that two or three doses of the medicine would put an end to the disease. Richter' also considered it as useful towards the termination of the attack, but inefficient at its height, and in this opinion various other authorities coincide. According to Dr. West, if the paroxysmal character of the cough is well marked, and the fits are of frequent occurrence, but the child in other respects ails little, much benefit will accrue from the use of hydrocyanic acid. It sometimes exerts an almost magical influence on the cough, diminishing the frequency and severity of its paroxysms almost immediately, while in other cases it seems perfectly inert; and again, in others, without at all diminishing the severity of the cough, it exerts its peculiar poisonous action on the system so as to render its discontinuance advisable. This statement explains why some persons question its efficacy altogether, and why other physicians employed the remedy successfully in one epidemic but failed to derive any benefit from it in subsequent ones. The latter circumstance has been plausibly explained by the greater mildness of the disease on the first-mentioned occasions. On the whole, it appears to be a useful medicine in mild

^{&#}x27; Am. Jour. of Med. Sci., x. 128.

[•] Op. cit., ii. 523.

^{*} Ibid., iv. 51.

⁴ Diseases of Children, 3d ed., p. 342.

attacks of whooping-cough, and generally during the decline of the Dr. West prescribes a dose of half a minim of the acid every six hours for a child nine months old, gradually increasing the dose to one minim every four hours for a child of that age, and so in proportion for older children. If the child appear faint, or dizzy, or bewildered, after its administration, the dose should be diminished or the medicine suspended. The following formula is used by Dr. W.: B.—Acid. hydrocy. dil. miv; Sodæ bicarb. gr. x; Mist. amygdal. 3j. S.—A teaspoonful every sixth hour for a child nine months old. Simple nervous cough, apparently independent of pulmonary disease, is sometimes of great urgency and violence, and while it seems to be kept up by an irritable state of the system, appears to be aggravated by opiates and the usual expectorant remedies. For this affection there is no more certain palliative than hydrocyanic acid. Dr. Hayward and numerous authorities concur in this opinion. In spasmodic asthma its benefits are much less distinct; indeed, so many remedies excel it in relieving this complaint that it need scarcely be employed in its treatment.

In other spasmodic affections its advantages are by no means eminent. Andral and Becquerel, who experimented extensively with the medicine, found that, in severe cases of hysteria and in the nervous symptoms that attend chlorosis, it was altogether inefficient. A case of spasmodic dysphagia is reported by Richter, which, from its degree and long duration, as well as from the extreme emaciation it had caused, was thought to be organic, but which was rapidly cured by hydrocyanic acid in conjunction with counter-irritation of the neck. In dysmenorrhoea this remedy seems occasionally to have acted as a palliative. In a case of angina pectoris Schlesier found that it afforded immediate and very decided relief. In diseases of the heart Andral and Becquerel regarded it as more injurious than useful. Richter found it beneficial in neuralgia resulting from cold or combined with a rheumatic element; and Dr. Coates reported two cases of the latter description in which it procured a more decided advantage than the other remedies employed.

Gastralgia.—One of the earliest applications of the remedy in England was to the relief of this form of dyspepsia, for which it was first generally introduced in that country by Dr. Elliotson.³ He prescribed it in cases of which the main symptoms were pain and tenderness of the epigastrium; and although the previous duration of the disease varied from a few weeks or months to as many years, it yielded with great rapidity. In another series of cases epigastric pain and tenderness were accompanied by such symptoms as flatulence, vertigo, headache, loss of appetite, nausea, pyrosis, vomiting, nervousness, palpitation of the heart, cough, and dyspnæa. In these, too, the acid was equally successful. This application appears to have been originally suggested by Sprengel, who doubtless drew the idea from a similar use of laurel-water in the last century. Dr. A. T. Thompson,

¹ Op. cit., ii. 523.

⁹ Med.-Chir. Rev., 1821, i. 639.

² Med. Recorder, iv. 146.

perhaps without a knowledge of these circumstances, also suggested its use, and even at a much later period continued to believe that no remedy is so well adapted, as an adjunct of tonics, for removing those dyspeptic affections which are attended with irritability of the mucous membrane of the stomach, and accompanied with heat and soreness, and the elongation of the papillæ of the tongue. In 1828, Dr. Bailey published a tabular record of cases similar to those of Dr. Elliotson. Their prominent symptoms were epigastric tenderness, indigestion, flatulence, and palpitations of the heart. He prescribed three minims of the British officinal hydrocyanic acid three times a day, and cured all of his cases in from one to three weeks. Its effects were striking from the first days of its administration.2 All of these writers regarded the medicine as improper when the dyspeptic symptoms were attended by fever. Dr. Pereira contributed to the history of the complaint in question several striking examples of the prompt and permanent relief of its symptoms by this medicine. But, as he remarks, it is attended either with perfect success or perfect failure. It not only allays pain, but relieves vomiting. Enteralgia is no less certainly and immediately palliated by this remedy, and in most instances is permanently cured by it. Dr. Prout has found it useful in the pains of colica pictonum.

The sedative action of hydrocyanic acid has been employed by Dr. K. McLeod to allay excitement in mania and other active forms of insanity. Although he admits that in the greater number of his cases its benefits were slight, or, at most, transient, yet he claims that in a certain proportion, about one-fifth of the whole number, the medicine was the main cause of a rapid restoration of reason. The dose varied from two to six minims, repeated every fifteen minutes, or at such intervals as were required to sustain its specific action. It was admi-

nistered by the mouth and also by subcutaneous injection.3

In chronic pulmonary affections, and even in phthisis, hydrocyanic acid was at one time extravagantly praised by several English and other European writers, who acquired a wide-spread notoriety by their alleged success in its employment. Foremost among them were Dr. Granville and Magendie, whose reports of success bordered on the marvellous, but which neither contemporaneous nor more recent experience has confirmed. The whole value of the medicine in consumption is now well ascertained to consist in its power of allaying the cough.

Acute inflammation, of the lungs especially, was at one time supposed to have encountered a specific cure in the acid under notice. Great was the surprise of the physicians and students, says an Italian writer, at Borda's clinique in the hospital of Pavia, when they saw these affections yielding as if by enchantment to the use of the medicine. The fever ceased immediately; a gentle moisture appeared upon the skin; the pulse fell, and resumed its normal characters; a salutary expecto-

London Dispensary, p. 839.

² Lond. Med. Repos., Apr. 1828.

³ Times and Gaz., Mar. 1863, p. 262.

⁴ History and Practical Treatise on the Internal Use of the Hydrocyanic Acid in Pulmonary Consumption, &c. Second edition. London, 1820.

⁶ GIACOMINI.

seldom be employed, even if they were efficient; but, although proposed, and even vaunted, there is no ground whatever for confidence in them as practical resources against this poison. In regard to ammonia, which has been considered the chief resource by some experimenters, Orfila concludes that it is very decidedly useful if properly employed; that is to say, if the preparation be not strong enough, or so constantly applied, as to cauterize the mucous membrane with which its vapor comes in contact when inhaled. Mr. Nunneley's experiments do not contradict this statement, although his general conclusion does. He thinks that it may be useful in cases where the dose has been so small as to leave it uncertain which way the balance of life will turn; but he does not appear to have applied ammonia so that the poisoned animal should duly inhale it, but rather to have rubbed it upon the skin, or immersed the animal in a vessel containing more or less of the vapor of ammonia. If, as there is reason to suppose, this agent operates only by means of its stimulant properties, and that chiefly through the Schneiderian membrane, these methods of testing its virtues were clearly inappropriate. Artificial respiration, produced by compressing the thorax, although nothing more than a subordinate resource, ought never to be neglected, and the same may be said of shaking. Indeed, Mr. Nunneley was inclined to estimate the value of the latter as high as anything he tried. But of all the resources against poisoning by hydrocyanic acid, none is so valuable as cold water, applied to the upper part of the body in the form of a douche.' This is the inference to be made even from experiments on quadrupeds, whose thick hair and hide necessarily caused its effects to be less decided than they would have been in analogous degrees of poisoning in the human subject. The water is not to be applied, as some have recommended, by immersing the whole body in it, a plan which infallibly destroys whatever vitality is left, but is to be dashed upon the chest and spine at intervals, so as to excite the respiratory act, and with it renew the series of organic changes on which life depends. The first effect of this treatment, when successfully employed during the stage of paralysis or resolution, is to excite spasms of the muscles, which grow firmer, and ultimately regain their natural tone. Besides experiments on animals, numerous instances of the success of this antidote in poisoning by hydrocyanic acid' indicate that it is one never to be neglected. It should be at once resorted to on the discovery of the patient's condition or on the first development of the symptoms, and, along with ammonia applied to the nostrils, artificial respiration by compression of the chest, and judicious agitation of the patient, should be relied on as the chief resource against the effects of this deadliest in the catalogue of poisons.

¹ See a memoir by Dr. Herser in Journal des Progrès, xvii. 33.

² TAYLOR, On Poisons, 2d Am. ed., p. 587.

POTASSII CYANIDUM.—CYANIDE OF POTASSIUM.

DESCRIPTION AND PROPERTIES.—This substance is obtained by subjecting a mixture of ferrocyanide of potassium and carbonate of potassa to a strong heat. Oxide of iron is precipitated, carbonic acid given off, and cyanide of potassium remains in a liquid state. When cool it is white, opaque, amorphous, and has an alkaline reaction, and the characteristic smell and taste of bitter almonds. It deliquesces

rapidly on exposure to moist air.

The properties of the salt are identical with those of hydrocyanic acid, for which it may be used as a substitute. In two grain doses it is fatal to the smaller animals. A solution of it, applied to the tongue, causes a sensation of coldness, which is followed by irritation and constriction of the fauces; and if allowed to remain long in contact with the skin, it is apt to excite a papular, or even a vesicular eruption. It may also at the same time occasion general symptoms like those of hydrocyanic acid. According to Mr. Hornidge, it is certain that three grains are sufficient to destroy life. In a case reported by Dr. C. E. Ware, of Boston, seven grains were fatal to a woman in less than an hour. Immediately on swallowing the solution she was seized with a severe burning pain in the stomach, and a feeling as if the bowels were about to act. In three or four minutes she became unconscious; there was no convulsion, but in ten minutes after the heart ceased to beat there was a sudden convulsive action of the whole body. A drop of the solution upon the conjunctiva causes severe, but momentary, pain. The powder, either pure or incorporated with cerate, excites severe burning pain when applied to the skin, and, if allowed to remain, will produce an eschar.3 Several cases are recorded of poisonous effects produced by this salt on its application to the chapped or otherwise fissured skin.

Uses.—M. Trousseau states that in solution it is very efficacious, when applied to the forehead, in headaches depending on dyspepsia, and connected with imperfect menstruation, or such as are generally included under the term sick headache. The solution should contain from two to four grains of the salt in an ounce of water, and be applied on compresses.

The same solution forms a very convenient means of removing stains of nitrate of silver from the skin, which it does more quickly and thoroughly than iodide of potassium. It should not be applied unless the skin is sound.

Internally this medicine may be given in the dose of one-eighth of a grain.

¹ Times and Gaz., Jan. 1859, p. 80.

² Bost. Med. and Surg. Jour., Dec. 1856, p. 387.

^{*} TROUSSEAU and Pidoux, op. cit., ii. 144.

ACIDUM CITRICUM.—CITRIC ACID.

LIMONIS SUCCUS.—Lemon-Juice.

Description.—Lemon-juice is derived from the fruit of Citrus Limonum, a native tree of India, but naturalized in all warm climates. Besides mucilage, which disposes it to ferment, lemon-juice contains nearly two per cent. of citric acid. Its agreeably acidulous flavor is too familiar to require description. Citric acid is obtained from lemon-juice or from that of other fruits which contain it by saturating it with prepared chalk, by which means a citrate of lime is obtained, and then adding sulphuric acid, which sets the citric acid free. It is without color or smell, but has a very sour taste. Its

crystals are transparent rhomboidal prisms.

ACTION.—Christison and Coindet gave drachm doses of citric acid to cats without observing that the animals suffered any inconvenience therefrom, but Orfila ranks it with the irritant poisons. With half a drachm of citric acid Mitscherlich killed a rabbit in twenty minutes. One drachm did not kill a larger animal. Two drachms killed in from twenty-seven minutes to some hours. The animals showed the strong action of the poison upon the spinal cord. There was spasm of the muscles of the back, of the respiratory muscles and masseters; often opisthotonos. The sensibility was much diminished, and the heart's impulse enfeebled. On examination no inflammatory appearances were observed in the stomach and bowels. The mucous membrane was uninjected, but softened in spots. The large external veins were filled with fluid blood, and the blood flowed easily from a vein when opened. The blood itself was very thin, and coagulated slightly, if at all. These conclusions agree with those obtained by Schroff, who also states that, according to Wöhler's experiments, the acid appears to be combined with lime in the urine. This may be the case when the quantity of acid administered is small. It then, very probably, combines with salifiable bases in the alimentary canal, and is absorbed thus into the blood to be again excreted unchanged with the urine.

Dr. H. Bence Jones has shown that an ounce of lemon-juice contains twenty-seven to twenty-eight grains of citric acid and only three-quarters of a grain of potash; so that for all practical purposes it may be considered a solution of free citric acid. When given in daily doses of twelve ounces it temporarily causes an excessive acidity of the urine and gives a deposit of free uric acid, which is the very opposite effect to that produced by the citrate of potassa and other vegetable acid salts.

The most evident physiological action of this, as of other vegetable acids, is its power of allaying thirst, which accounts for its gratefulness and real utility in all febrile affections in which this symptom is predominant. Its toxical action upon animals, including its liquefying

¹ Times and Gaz., Oct. 1854, p. 407.

by experience that citric acid is not the equivalent of lemon-juice in this respect, and that vinegar and other acids are of comparatively slight efficacy, and, on the other, that certain fresh vegetables (cruci-feræ), which contain little or no acid, are even more potent anti-scorbutics than lemon-juice itself.

In 1849 Dr. G. Owen Rees brought before the profession a report on the beneficial effects of lemon-juice in acute rheumatic affections. The sensible operation of the remedy, according to him, consists in its reducing the force and frequency of the pulse, and in securing an early relief from pain. An examination of his reported cases do not demonstrate the advantages of the treatment in shortening the attack, but in mitigating its severity the effect appeared to be favorable. Subsequently, Dr. Rees found that lemon-juice exerts no favorable influence over syphilitic and gonorrhoeal rheumatism, or over that form which is found in connection with purulent discharges not necessarily gonorrhoeal. The subsequent and very general use of lemonjuice in the treatment of rheumatism has been adverse to a belief in its curative power, and it is now seldom employed except in the form of lemonade as a grateful drink in the more inflammatory forms of the disease. It was prescribed by Dr. Rees and others in doses of one or two ounces three or four times a day. Although generally tole-

rated, yet it sometimes occasions severe griping or diarrhœa.

Next to its use as an anti-scorbutic, lemon-juice is most valuable as a drink in febrile affections in which the thirst is urgent and the bowels are not disordered. This is usually the case in eruptive and periodical fevers. In hemorrhages it not only assuages thirst but directly counteracts the tendency to loss of blood. In all such cases it should be administered cool, and in the last mentioned as cold as possible. Its diaphoretic operation is greatly promoted by administering it in the form of an effervescing draught, which is made as follows: Take of bicarbonate of potassa sixty grains, water four fluidounces. a solution, of which add a teaspoonful to a tablespoonful of lemon-juice diluted with a tablespoonful of water, and drink during effervescence. Lemon-juice in tablespoonful doses several times a day is reputed to be a remedy for jaundice produced by hepatic congestion. It forms an excellent topical application in gangrenous sore mouth and other varieties of gangrene from constitutional causes, and has been used with striking advantage to relieve pruritus of the genital organs. Finally, it may be employed as an antidote to alkaline and narcotic poisons.

Lancet, June, 1853, p. 534.

CLASS IX.

ARTERIAL SEDATIVES.

THE pulse is regarded as one of the best indices of the state not only of the circulatory apparatus, but also of the general system, and at first sight it would seem as if its condition might be taken as a safe guide in the choice of remedies calculated to exert an influence upon the heart. But a little reflection makes it evident that this is a mistaken opinion. Morbid arterial action is not always of the same nature. An excess of the normal nutritive constituents of the blood may give the pulse a force which suggests the existence of fever, although its degree of frequency may not be proportionately great. The same effect is often produced by simple hypertrophy of the left ventricle of the heart. These are cases rather of the imminence of disease than of its actual existence. Again, in febrile affections the force and frequency of the heart's contractions are increased, in consequence, probably, of the presence and retention in the blood of an excessive proportion of some effete and morbid material arising from the disintegration of the solids. In all of these cases immoderate arterial action is the consequence of a positive redundance of normal or abnormal elements in the blood. The redundance may, however, be relative. The quantity of blood in the body may not exceed the amount required for nutrition, but, owing to a mechanical obstacle in the heart itself, such as a contraction of the mitral or the aortic valves, this organ may be forced to act with unnatural frequency in order to maintain a due supply of blood in all the organs. The same effect is produced when, instead of a mechanical obstacle impeding the passage of the blood propelled by a powerful ventricle, the ventricle itself is feeble in consequence of dilatation, softening, fatty degeneration, &c.

But conditions the very opposite of those mentioned may occasion frequency of the pulse. The simplest type of this group is a case of sudden and profuse hemorrhage, in which the pulse becomes exceedingly frequent, and often presents a tension under the finger which cannot always be distinguished from that which accompanies inflammatory fever in a person of good constitution. The same pulse is often observed in chronic anemia, chlorosis, and the advanced stages of chronic disorders accompanied with disorganization. In such diseases the frequency of the pulse is due, in part, to the necessity of

maintaining the strength of the body by a more rapid distribution of its imperfect nutriment, and thus compensating, by a frequent renewal of the supply, for its defective quality. It is also partly due to the excitability of the nervous system which always attends impoverishment of the blood, and is most frequently, perhaps, the immediate

cause of functional palpitation of the heart.

With these facts distinctly before the mind, it seems hardly necessary to remark that it would be impossible for the same medicines in all cases to allay undue arterial action. The nature of some as plainly requires the use of depletion, evacuants, and sedatives, as that of others does the administration of stimulants, nervines, and tonics. Practically, therefore, the class of arterial sedatives might be considered as embracing all of these antagonistic medicines, and many others be-But we have thought that two among them are so peculiar in their operation, depressing so directly and powerfully the action of the heart when given in appropriate doses, that they are entitled to stand in a class by themselves. Digitalis and veratrum viride are the only medicines which display this power. It matters little for our present purpose whether it resides in them as an essential and primary virtue, or whether, in the case of one or both of them it is secondary to some more general operation upon the nervous system. The question is perhaps difficult of decision; but, in regard to digitalis, the truth appears to be, that, like several of the class of diffusible stimulants, it acts as a direct sedative of irregularity of the heart depending upon debility, by giving strength, or at least temporary power, to this organ; and that, when its toxical action is developed, it renders the pulsations of the heart less frequent by an influence almost peculiar to itself and to veratrum viride, though analogous to that which in aconite is associated with powers of a different description. Veratrum viride manifests more unequivocally than its associated medicine a sedative action on the heart, and displays it without any necessarily antecedent phenomena, in states of the system decidedly sthenic, and even in fever of an inflammatory origin and type. These facts have seemed to require that the two medicines should be comprised in an independent class. No allusion is here made to the diuretic virtues of digitalis, which are perhaps more valuable than any others which belong to it, and which would rank it with squill, parsley, and broom, did it not also display its peculiar action on the heart.

DIGITALIS.—DIGITALIS.

DESCRIPTION.—The leaves of Digitalis purpurea, from plants of the second year's growth. This biennial plant is a native of Europe, where it grows wild upon exposed hill-sides and river-banks. It is also cultivated in gardens on account of its beautiful purple flowers, which are arranged in a spike of pendulous bells, upon a stalk of from two to five feet in height. The leaves are very large, the lower ones measuring seven or eight inches in length by two or three in breadth. They are of a loose texture, and are of a deep green color upon their

Edinburgh Pharmacopæia, and this fact shows the apprehension with which the use of the medicine was regarded. Its final introduction to a determinate position in the Materia Medica was due to Withering, in 1775. But he was induced to make trial of it by discovering that it formed the chief ingredient in an old family receipt for dropsy, which had long been kept secret, and also by the cure of one of his friends affected with dropsy of the chest by means of another empirical prescription of the foxglove root. It would appear, indeed, to have been a popular domestic remedy for dropsy in several parts of England. In this, as in so many other cases, science was the adopter, and not the discoverer, of the therapeutic virtues of a plant.

After many attempts to isolate the active principle of digitalis, it was finally obtained in a pure state, in 1844, by MM. Homolle and Quevenne, who entitled it digitalin. It occurs in pale straw-colored scales, or a white powder, and is inodorous and extremely bitter; its taste is most strongly perceived in the fauces; its smell is peculiar and faintly aromatic; it acts as a violent sternutatory when diffused through the air, and, when applied to the denuded cutis, irritates it powerfully. It is most soluble in alcohol, is neutral in its chemical relations, and combines neither with acids nor bases. It is unchangeable by expo-

sure to the air.

On Animals.—The preparations of digitalis administered in large doses to dogs produce restlessness, dulness, slowness of the pulse, watery dejections, a staggering gait, convulsions, and death. A hen that had taken the powder of digitalis for some time, became drooping and began to shed her feathers. A turkey-hen staggered as if drunk, and voided reddish excrements, but ultimately recovered; while another grew dull, erected its feathers, and drew back its neck spasmodically. After eating the leaves for several days it refused any more, its excrements were red, its gait was tottering, it became convulsed, and ultimately, at the end of eighteen days, died very much emaciated. Orfila inferred from his experiments that digitalis first quickens the circulation and then retards it, rendering it, at the same time, more or less irregular; that it produces symptoms of intoxication or stupefaction, augments largely the secretion of urine, and irritates the mucous membrane of the genito-urinary passages, and, wherever applied, tends to produce inflammation.

Traube performed a number of experiments by injecting an infusion of digitalis into the jugular veins of dogs. He concluded from them that, in proper medicinal doses, digitalis is a stimulant of the circulation, and particularly of the heart, but in large or poisonous doses acts as a direct sedative of the circulatory organs, ultimately paralyzing them. He maintained, however, that the diminished frequency of the pulse is, in cases of feebleness of the heart, a proof of the stimu-

lant operation of the medicine.3

Annuaire de Thérap., 1845, p. 60.

Санатат's Jahresbericht, f. 1852, p. 121.

Bouchardat and Sandras' found that in two grain doses digitalin was fatal to dogs in a period varying from a few minutes to several hours,

WIBMER, Wirkung der Arzneimittel, &c., ii. 313. * Toxicologie, ii. 566.

according to the vigor of the animals. The symptoms were staggering, vomiting, diarrhœa, irregularity of the heart, and an abrupt and strong pulse which was also rendered uniformly infrequent without having first been accelerated. Stannius' performed a number of experiments with digitalin on cats, dogs, &c. He concluded that in the former animals large doses of it acted directly upon the heart, destroying at once its motility and vitality. In half grain doses it was promptly fatal when thrown into the bloodvessels, and annihilated the irritability of the heart. When introduced into the stomach, or so employed as to be only gradually absorbed, the following symptoms were observed; the tongue was alternately protruded and retracted, there was retching, vomiting, diarrhoea, and a discharge of urine, dilatation of the pupils, irregularity, and then complete arrest, of the heart's movements, convulsions and death. Stannius observed a remarkable difference in the susceptibility of different classes of animals to this agent. Frogs bore it well, rabbits were unaffected by a dose which was rapidly fatal to a small cat, and carnivorous animals generally were more affected than the herbivorous.

On Man.—According to Boerhaave, digitalis may produce ulceration of the mouth, esophagus, and stomach; but this statement has

not been confirmed by subsequent experience.

Withering's description of its effects' corresponds very nearly with the results of the most accurate observers since his time. According to him, when given in very large and quickly repeated doses, it occasions sickness, vomiting, sometimes a copious flow of saliva, purging, giddiness, and confused vision, objects appearing green or yellow; increased secretion of urine with frequent motions to void it, and sometimes inability to retain it; a slow pulse, even as slow as thirty-five in a minute, cold sweats, convulsions, syncope, and death. When given in smaller doses it produced most of these effects in a lower degree; and it is curious to observe, says Withering, that the sickness, with a certain dose of the medicine, does not take place for many hours after its exhibition has been discontinued; that the flow of urine will often precede, sometimes accompany, and frequently follow, the sickness at the distance of some days, and not unfrequently be checked by it. The sickness thus excited is extremely different from that occasioned by almost every other medicine; it is peculiarly distressing to the patient; it ceases and returns again as violently as before; and thus it will continue to recur for three or four days, at more and more distant These sufferings are generally rewarded by a return of appetite much greater than existed before the use of the medicine was commenced. Lettsom, who was also one of the earliest favorers of the drug, describes its general effects in the same terms as Withering, but with rather more detail. According to him, the sickness it produces is very like the effects of tobacco, and resembles sea-sickness. languor is diffused throughout the whole system; the extremities, the

^{&#}x27; CANSTATT'S Jahresb. f., 1851, p. 81; Archiv f. Phys. Heil., x. 178.

<sup>MURRAY, Apparat., i. 731.
An Account of the Foxglove, &c., Birmingham, 1785, p. 184.</sup>

Memoirs of the Med. Soc. of Lond., ii. 173. VOL. II.—15

hands particularly, become moist and clammy, and feel cold to the touch; there is a confused aching and heaviness of the head; flashes of light frequently pass before the eyes, or almost all objects appear brilliant, and sometimes, after these symptoms pass off, the sight remains impaired for several weeks. These, and, it is believed, all of the earliest English writers on the effects of digitalis, appear to regard its influence on the pulse as being uniformly of a depressing nature, a circumstance which may, perhaps, be ascribed to the state of disease in which the subjects of their observations were, as well as to the small and gradually increased doses of the medicine that were prescribed. An American observer, Dr. John Moore, early demonstrated the want of uniformity in the action of digitalis on the pulse.' By doses of one and a half grains he caused his pulse to fall from 70 to 60 in the course of two hours; from 60 to 50 in one hour and twenty minutes; from 66 to 58 in two hours and a quarter; and from 90 to 70 in about the same time. But in several other experiments there was no depression of the pulse whatever; and in others again it positively increased in frequency, while the experimenter suffered vertigo, confusion of mind, fulness of the head, drowsiness, salivation, nausea, diarrhœa, &c. The experiments of Bidault de Villiers coincide in the main with those He also observed salivation as one of the effects of the first detailed. medicine.

The experiments of Saunders were, it is believed, the first to throw doubt upon the supposed intrinsically depressing powers of digitalis.3 By more than two thousand trials of its influence upon twenty-nine healthy persons, he was led to the conclusion that the direct effect of small doses of the drug is to increase the strength and frequency of the pulse, and even to develop an inflammatory state of the system; yet when once these effects were produced, if the dose was augmented, or the digitalis continued at the previous dose, an astonishing lowness of the pulse and debility ensued. These results were corroborated by observations upon the sick, which showed that during the primary action of the medicine sores begin to heal, effusions are removed, and all the functions of the body are invigorated, the pulse gaining by degrees in strength and fulness until fever is excited, when the toxical phenomena display themselves, and the whole system is prostrated and deranged. The bold experiments of Hutchinson illustrate in a striking manner these opposite actions of digitalis. They consist of three series. In the first of them 60 drops of a tincture were taken (equal to five grains of the dried leaves), and the dose was repeated at intervals of six hours. Every day the quantity was increased, so that at the end of the third, it reached 380 drops for that day. The symptoms were chiefly these: nausea, vomiting, craving for food, followed by pain in the stomach, salivation, diarrhoea, increased discharge of urine, unusual activity of mind, sleeplessness, some constriction of the head, and excitement bordering on delirium. These symptoms were followed by weariness, listlessness, and almost stupor.

¹ CALDWELL'S Theses, 1800.

^{*} Edinb. Med. and Surg. Jour., iv. 369.

² Dict. de Méd., en 60 vol.

⁴ Jour. des Progrès, vi. 218.

Barbier as its primary, and sometimes its only one, but he remarks, as others have done, that sedation or slowness of the pulse generally succeeds. The same doctrine might be deduced from the observations made of the use of digitalis in disease. In dropsy, for instance, nearly all writers coincide with the remark of Christison, that the sedative action of the drug interferes with its diuretic effects. And this conclusion agrees with the results of experiment already set forth, which prove that divresis not only does not follow the sedative action of digitalis on the heart as the effect of the latter, but both precedes it and is actually suspended by its occurrence. There seems to be scarcely any doubt that diuresis is a true medicinal result of the action of digitalis, while slowness and infrequency of the heart's action, when the organ is not previously diseased, is the first stage of its poisonous effects. It is, therefore, always a sign that the use of the medicine should be suspended.

The doctrine which we have endeavored to illustrate in these pages has received a remarkable corroboration from the observations of Mr. W. Howship Dickinson on the operation of digitalis upon the uterus.* As usual, this important discovery was accidental. A female was almost exsanguious from prolonged uterine hemorrhage occasioned Sulphuric acid, acetate of lead, and tannic acid were used in vain. An attack of pericarditis supervened, and after it the action of the heart became tumultuous, and was accompanied with "a regurgitant aortic murmur." With a vague idea that the cardiac derangement might maintain the hemorrhage, digitalis was prescribed, and immediately an improvement began which terminated in health. sixteen cases of uterine hemorrhage the same treatment was essayed, and the digitalis was administered before and during labor when the pains were inadequate. They all demonstrated the power of the drug to excite the muscular action of the uterus. A short time, generally about ten minutes, after a considerable dose of the medicine was swallowed, the patient complained of severe pain in the region of the sacrum, which passed into the hypogastrium, and in every respect resembled the pain of the first stage of labor; very shortly afterwards a considerable quantity of blood, generally in part coagulated, was forced out of the uterus. A case, illustrative of the action of digitalis in arousing uterine contractions during labor, occurred in Paris under the care of M. Delpech.3

It is remarkable that fatal results should be comparatively infrequent from overdoses of a medicine which possesses such a control over the central organ of the circulation. When, too, it is considered how small a quantity will sometimes occasion alarming symptoms, the comparatively trivial effects of enormous doses are difficult to be explained. Thus, for example, one person took a teacupful night and morning, of a saturated infusion of digitalis; another swallowed nearly the same quantity at a single dose; another took an ounce of

Dispensatory (Am. ed.), 447.

Bull. de Thérap., lvi. 101.

² Med -Chir. Trans., xxxix. 1.

⁴ TAYLOR, Med. Jour. (Am. ed.), 598.

the tincture of digitalis; and a fourth half an ounce of the same preparation.1

In all of these instances the symptoms were more or less alarming, but the termination was fatal in none. The dose does not seem to have been well ascertained in the published fatal cases, at least of The symptoms of fatal poisoning by digitalis are summarily these: cramps in the limbs, convulsions, lethargy, dilated pupils; swelling of the tongue and lips, a discharge of viscid saliva, vomiting, suppression of urine; a slow, infrequent, irregular, and intermitting pulse; and finally death by coma. Congestion of the brain, and redness of the mucous lining of the stomach, are the only lesions found a ter death from this substance. A fatal case is reported by Dr. Caussé,2 in which a pregnant female took a poisonous dose of the fresh juice of digitalis, and, as violent vomiting, diarrhoea, and abortion followed, it is not easy to determine whether death was due to the last named occurrence, or to the direct agency of the poison. In another case the patient, a young lady, had half an ounce of infusion of digitalis given her every four hours for the cure of epilepsy. The dose was rapidly increased until, on the fourth day, it reached two ounces every four After taking the second dose, she suddenly became faint, tremulous in the limbs, said she could not see, fell back, and was dead in an instant.3

According to the experiments of MM. Homolle and Quevenne, doses of digitalin varying from 1/5 to 1/1 gr. in the course of twentyfour hours, reduced the pulse to 55, 50, and even 40 beats a minute. The larger dose could not be exceeded without producing characteristic symptoms of poisoning. After eight or ten days' use of the medicine the pulse became unequal, irregular, and intermittent. digitalis, this proximate principle affected the heart differently, according to the existing state of the organ. When already irregular, moderate doses restored its normal rhythm, while large or long continued doses deranged the natural order of its movements. The impulse was uniformly increased by moderate doses, proving this agent to be rather a sedative than a debilitant of the heart, as was shown to be the case with digitalis. But the primary action of the latter was also proved to be that of a stimulant to the circulation, and at the same time diuretic, whereas digitalin displays its power mainly as a sedative of disordered cardiac action. The diuretic action of digitalin appears to have been but slightly manifested, as a physiological effect, either in the experiments just described or in those about to be detailed. Those of MM. Andral and Lemaistre were performed with smaller doses than have been mentioned. They began by giving about g gr. of digitalin once or twice a day; but even this dose produced considerable disturbance of the system after three or four days' continuance, and when repeated five or six times within twenty four hours, gave rise to decidedly toxical phenomena. Such, at least, was the ordinary result;

• Am. Jour. of Med. Sci., Jan. 1853, p. 192.

BECK, Med. Jur., ii. 644.

Annales d'Hygiène, Avril, 1859, p. 464.

^{*} Times and Gaz., Oct. 1860, p. 417.

* Annuaire, &c., p. 71; Archives de Physiologie, Jan. 1854, pp. 248, 249.

but in some cases as many as twelve doses a day were taken without inconvenience. As a general rule, the pulse was more uniformly reduced in frequency (by from 12 to 40 beats) when the patient had a non-febrile disease, such as an organic disease of heart, than when fever existed. The diuretic action of the medicine was not always dis-Sometimes it was absent, and sometimes very decided, particularly in dropsy connected with heart disease, or with albuminuria. The apparently feeble diuretic operation attributed by these observers to digitalin, may have been due, as Dr. Christison suggests, to their regarding the sedative action of the medicine on the heart as a needful preliminary to its operation on the kidneys. But the former, instead of favoring actually interferes with and may even suspend the latter. The interesting observations of M. Hervieux lead substantially to the same results as have been here set forth.' Like other observers, he found that the medicine caused irregularity in the normal pulse, but restored the irregular pulse to a healthy rhythm. The experiments of MM. Bouchardat and Sandras so nearly coincide in their results with those already cited, as to render a summary of them unnecessary.2

The more recent researches into the operation of digitalin have confirmed the general views respecting it which have here been inculcated. It will have been remarked that the statements in regard to its diuretic virtues are very inharmonious. But assertions like those of Jörg, that digitalis augments the discharge of urine, as a physiological operation, are now proved to be utterly untrustworthy. Among recent experimenters, Bähr is the only one that repeats the old fallacy, but his own recorded experiments convict him of error by showing that the increase of urine was in exact proportion to the increased quantity of liquids consumed. Germain, Winogradoff, Pfaff, and Stadion all failed to observe the slightest diuresis produced by digitalin in the healthy state; on the other hand, they, as well as Dr. Hammond, found that it lessens the proportion of all the solids in the urine except uric acid, and hence lowers its specific gravity, while diminishing the amount of urine secreted.

Stadion, in his experiments upon himself, began with doses of digitalin of two milligrammes a day ($_{3}$, gr.), and daily increased the dose by one milligramme, so that on the nineteenth day he took about one-third of a grain. During the whole period of his experiments he used 189 milligrames, or three grains. In his observations upon the pulse he took the precaution to count it before rising in the morning, and consequently before it could be influenced by external causes. During the first eight days it rose from 50-51 to 52-55, and then gradually declined to 46-44. It does not follow that the pulse-rate may not be directly diminished by large doses of the medicine, as many observers have alleged it to be. All are, moreover, agreed that the slower action of the pulse is attended with an increase of its fulness and force. Stadion at the same time noted its increased irrita-

¹ Archives Gén., 4ème sér., xvii. 164.

Prager Vierteljahrs., lxxiv. 97.

² Loc. sup. cit.

bility, so that slight muscular or other excitement quickened its rate perceptibly. He also experienced paroxysmal distress in the præcordial region, which he compared to rheumatic pains, and attributed

to an action of the medicine upon the nerves.

The special mode of action exerted by digitalis upon the heart has already been stated to be probably of a tonic, and not of a debilitating Experiments made with digitalin confirm this opinion. Among others, Dr. C. Handfield Jones found that in animals poisoned by digitalis, the heart, after death, was firmly contracted, a condition, he remarks, more like tonic spasm than paralysis; and he refers to Traube's dynamometrical experiments to show that a heavier column of blood is raised by an animal's heart under the influence of digitalis than without it. But it must be acknowledged that these experiments only prove the persistence of the muscular contractility, they do not demonstrate the preservation or increase of that other power, analogous to the voluntary contraction of muscles of animal life, by which the rhythmical movements of the heart are maintained. this connection it may not be uninteresting to state that Dybkovsky and Pelikan having used, in experiments upon frogs, upas poison, extract of Tanghinia venenifera, veratrum viride, and digitalis, the heart was in every case found strongly contracted: yet these observers regard the phenomena in question as an effect of paralysis of the heart, and they class the four substances used in their experiments together in one group as "cardiac poisons." It is evident, therefore, that the increased power of the heart under the influence of digitalis is not identical with that which it acquires from the use of diffusible stimuli or hematic tonics, but, on the contrary, may coexist with a really impaired muscular energy.

This inference acquires support from the condition of other apparatus than the circulatory, while the latter may seem to be gaining in tone and power. In Stadion's experiments with digitalin, as in those with digitalis already referred to, the appetite failed, there was nausea and malaise, a disagreeable and pasty taste in the mouth, loss of appetite, and aversion to food. These symptoms were followed by an almost irrepressible desire to vomit. The head was oppressed and painful and the mind confused. Giddiness and somnolence occurred in the last days of the experiment, and persisted for several days after its close. Frequent scintillations rendered vision imperfect. An extreme and indescribable debility affected the limbs; the hands and feet felt as if weighted with lead, and there was an irresistible desire to keep perfectly still. There was, moreover, a rapid loss of flesh, not to be explained by the excreta, for there was neither vomiting, diarrhœa, nor diuresis. As emaciation proceeded, the countenance acquired a color and expression which Stadion compared to that which is observed in the forming stage of typhoid and eruptive fevers. continued for a week even after the use of the medicine had been

suspended.

It has been seen above that Jörg enumerates excitation of the gen-

¹ Prager Vierteljahrs., lxxviii. Anal. 20.

ital organs among the phenomena produced by digitalis. Directly the opposite effect from digitalis has been recorded by several competent observers. Many years ago! L. Corvisart reported several instances of its success in curing seminal emissions, which he attributed to its sedative tonic influence upon morbidly stimulated organs. Brughmans found that it prevented erections and their consequences produced by gonorrheal and syphilitic inflammation in persons who were otherwise healthy, and also determined that it totally annihilated sexual desire in persons free from venereal and all other disease.2 The former conclusion was also confirmed by Laroche. According to Pfaff, digitalis primarily depresses and afterwards stimulates the sexual organs, an opinion in which he stands alone. Stadion, who took much larger doses of digitalin, fully sustains the correctness of Brughmans' observations. During the whole period of time devoted to his experiments sexual desire seemed extinct, and after their completion it resumed its wonted activity very gradually.

Several cases of poisoning by digitalin are on record. In one of these a robust female took sixteen granules (nearly a quarter of a grain) of digitalin. Two hours passed without sensible effects, and then she was attacked with a nervous chill and vertigo. For nine hours more nothing remarkable occurred, but then the rigor was renewed, with dyspnœa and sweating. After a night's sleep all of the symptoms had disappeared. She then swallowed forty granules more, and in an hour was seized with disorder of vision, vertigo, cold sweating, vomiting, and colic, after which she became extremely faint. Neither urine nor fæces were passed during the day, and the voice became very feeble. The thirst was urgent, the urine suppressed, the eyes very prominent, the skin cold, the pulse 46, and the epigastrium

tender. In a week she had entirely recovered.

It seems to be an inevitable conclusion from the preceding statement of the phenomena caused by the preparations of digitalis, that the primary action of the medicine in ordinary doses is not depressing, as it is generally stated to be; that, on the contrary, it is a stimulant of the healthy system, and a moderator of morbid action depending upon general or local disease. When taken in excessive or poisonous doses, it appears with equal clearness to be a direct sedative, paralyzing the heart and nervous system, and so destroying life. This double action it shares with a great number of medicines, and, among those affecting the nervous system, with none more strikingly than with opium. Finally, it may be stated, as a part of the experimental history of the drug, that, according to Homolle, digitalin is altogether destitute of the nauseating and emetic properties of digitalis, while it represents the diuretic virtues of the medicine and its sedative operation upon the heart. The account which has been given above of the action of the plant and its representative principle, do not permit us to accept so absolute a conclusion. At the same time, they prove the

¹ Bull. de Thér., 1853, xliv. 145.

³ Ibid., xlvi. 76.

Annuaire de Thérap., 1858, p. 102.

² Ibid., xlv., 424.

⁴ Ibid., lx. 100.

⁶ Arch. Gén., Juill. 1861, p. 25.

superiority of digitalin in the mildness, safety, and certainty of its operation.

REMEDIAL EMPLOYMENT. Dropsy.—Although digitalis is not a direct diuretic, it is none the less a most powerful agent for the production of diuresis in certain conditions of which dropsy is a symptom. The remedial virtues of digitalis have been more clearly exhibited in this than in any other disease, to the cure of which it had long been applied empirically before it was adopted into the materia medica. It was for his success in treating dropsical affections with digitalis that the name of Withering will always occupy the most conspicuous place in its early history. To this day, even, his precepts in regard to its administration continue to be the safest guide for those who employ it. "I use it," says this author,1 "in ascites, anasarca, and hydrops pectoris, and, so far as the removal of the water will contribute to cure the patients, it will cure them. Hence the water has often to be repeatedly evacuated in the same patient when the cause of the dropsy remains." In the anasarca following scarlatina, Withering cured all of the cases, without exception, that he had to treat. sulted from his experience that if the patient be of great natural strength, a warm skin, and florid complexion, and with a tense, corded pulse, or if the effusion itself be hard and circumscribed, or the anasarcous limbs be solid and resisting, digitalis will be of little, if any, service, particularly if purging by the neutral salts, venesection, and squills do not precede and accompany the use of the former medicine. If, on the other hand, the pulse be feeble, the countenance pale, the lips livid, the skin cold, the belly soft and fluctuating, and the limbs readily pitting on pressure, the diuretic action of the medicine is generally successful.

Some additional indications were enumerated by Darwin. He regarded the medicine as being most successful when the patients were past the meridian of life, and accustomed to indulge too freely in fermented or spirituous liquors. Many of his own were subject to gout, and many had cedematous swellings of the thighs and legs, dyspncea, and an unequal pulse, signs which render it highly probable that they were affected with valvular disease of the heart. This is the more probable because in many cases the effusion recurred, and was removed again by the same treatment, and because the pulse continued to be irregular after the dropsy was cured. Darwin always suspended the medicine on the occurrence of sickness of the stomach; he also conjoined it with bark and iron in his treatment, and directed laxatives if the bowels were not freely opened. In dropsy confined to the abdomen, he, in common with most other physicians, found the remedy least successful; but cases of this variety were most readily relieved when the subjects of them were addicted to the intemperate use of alcoholic and fermented drinks.

Lettsom, in his first publication upon the subject,3 was disposed to

^{&#}x27; Op. cit., p. 6 et seq., and p. 189.

² Trans. Lond. Coll. Phys., iii. 255.

Mem. Med. Soc. Lond., ii. 145.

limit the usefulness of digitalis much more than the writers just referred to, excluding from the category to which it is applicable all cases depending exclusively upon a mechanical or organic cause. Withering, however, complained that the medicine had not been properly administered by Dr. L., who, in fact, was led subsequently to form a more favorable judgment of its powers, and particularly to guard against its depressing effects by a more prudent regulation of its doses, and by associating it with tonics and stimulants. did not conceive so high an opinion of this medicine in dropsy,1 but asserted his persuasion that when given in such quantities as to alter the pulse, if it does not speedily act as a hydragogue or a diuretic, it is merely loss of time to persevere in its exhibition. He agrees, however, with Withering in regard to the cases which it chiefly benefits, and states that he has seen all the symptoms of general dropsy, attended with a fluttering and feeble pulse, removed by digitalis in the course of a week. He particularly recommends its association with calomel and Dover's powder, a combination which even now is oftener used for dropsy than digitalis alone. Saunders regarded simple debility or exhaustion, without organic complication, as affording the best indication for the use of digitalis in dropsy.2 McClean, in his work on hydrothorax, expresses his agreement with the precept of the earlier writers on the subject under discussion, by alleging the peculiar efficacy of the medicine in persons of weak and lax fibre, where the œdematous limbs readily pit on pressure, and the complexion is pale and transparent. Blackall subscribes to the same doctrine, and Munk emphatically reiterates it.3 The former, indeed, specifies more particularly the appropriate cases for the medicine as being general dropsy after scarlatina, with coagulable urine, and sometimes even hydrocephalus from that cause. In hydrothorax he regards the power of digitalis as astonishing, and the more so when its combination with other remedies is avoided. Theoretical objections of two kinds, to the use of digitalis in dropsy of renal origin, have been proposed. Long ago it was argued that the renal disease being of an inflammatory nature, diuretics must necessarily aggravate it because they must irritate the kidney. Now, being considered a diuretic in the only sense then understood, digitalis was held to be a dangerous stimulant of the kidney. It is true that the rigor of this condemnation was modified by the judgment of authoritative physicians. Thus Bright, to some extent, sanctioned the use of digitalis, saying, it "has in some instances been cautiously administered with temporary advantage, and seems by its power of checking the circulation to be well adapted to those cases where the pulse is sharp, as frequently occurs throughout the whole progress of the disease."4 Digitalis and cream of tartar were recommended by Dr. Bright, and the same combination was employed by Dr. Christison who mentioned the difficulty he experienced in obtaining a diuretic operation from digitalis alone, although he used it to

¹ Med. Histories (Am. ed.), p 271.

⁹ Op. inf. cit.

² Med. Repos., xv. 403.

⁴ Reports, &c., p. 73.

sustain the action of the combination when once it had commenced. Dr. Miller, in his Essay on the Pathology of the Kidney in Scarlatina, objects to the prescription of digitalis in the dropsy resulting from that disease, on the ground that it occasions asthenia. Dr. Rees remarks that "the diuretic action of this drug is not of a stimulant kind," and states that "when discreetly exhibited there is much apparent benefit from its use." The dose, however, should be small, and its effects on the pulse narrowly watched.* Dr. Todd affirms that digitalis, with due precaution, is very useful in acute renal dropsy; and advises it in conjunction with tonics and iron in dropsy from cardiac disease. In all of these cases the dread of treating an asthenic disease by a medicine assumed to be a direct sedative, appears to have prevented its real action and curative value from being ascertained. Withering, it has been seen, cured scarlatinous and cardiac dropsy without greatly concerning himself with the question of its mode of operation; it was only when assumed notions of its action controlled its use, that its advantages were called in question. If, however, it be true, as already stated, that no evidence of its irritant action upon the kidney exists, the medicine may be restored to its former use in dropsy with albuminous urine, upon grounds which will appease scientific objectors as well as justify practical physicians.

The other objection referred to is founded upon the fact stated elsewhere, that under the influence of digitalis the elimination of effete organic matter by the kidneys is diminished. It is argued, therefore, that the medicine favors the occurrence of those toxemic phenomena which so frequently attend the advanced stages of Bright's disease, and may even add to them its own poisonous sedation. So far as we are aware, no record exists of any such evil consequences from the administration of digitalis at any stage of the affection; and therefore it is needless to discuss the possibilities of their occurrence. The organic condition of the kidneys may, and, at some stages of the disease, must, preclude all hope of evacuating the dropsical fluid through these organs; but experience accords with reason in teaching that a moderate use of digitalis forms a useful element of the treatment by which dropsical effusions may be diminished even in granular degene-

ration of the kidneys.

Among more recent authorities, the judicious Dr. Holland adds the weight of his testimony to the general principle which we have endeavored to inculcate; for, after pointing out the fact that there are many cases of dropsy in which a combined tonic and evacuant treatment is indicated, he states that in such he has found iron associated with digitalis eminently serviceable. Dropsy accompanied with dilatation and irregularity of the heart appeared to be remarkably improved by the medicine, and particularly thoracic and abdominal effusions. He agrees, too, with the opinion of the chief authorities now quoted, that the medicine is most efficient when the circulation is

On Granular Degeneration of the Kidneys, Sect. vi.

² Diseases of the Kidney connected with Albuminous Urine.

Notes and Reflections (Am. ed.), p. 332.

feeble and the fibre relaxed. It adds to the force of the considerations already presented on the subject to state that, according to Dr. Holland's experience, patients who have been weakened by disease often bear

much larger doses than those in sounder health.

Among American authorities, Rush¹ and Mease,² who flourished soon after the general introduction of the remedy into European practice, both speak disparagingly of it. The former, indeed, found it to fail in most of the cases for which he prescribed it. Dr. Chapman, however, confirms the most favorable judgment of digitalis by his own experience. He directs attention to its sometimes producing diuresis suddenly, and simultaneously with its secondary or sedative effects, a circumstance which is not in harmony with the observation of others. At the same time, he regards a low and enfeebled condition of the constitution as the most propitious for its exhibition.

The virtues of digitalis in dropsy have occasionally been manifested by its external application. Belluci reported five cases of the cure of hydrocele by the application of an ointment of digitalis to the scrotum, and Lafargue has confirmed them by a case in his own practice. He made use of an ointment containing one part of digitalis to five of lard. M. Falot, also, cured three cases of ascites, independent of organic disease, by means of fomentations made with two ounces of digitalis in a quart of water boiled down to a pint. Copious diuresis

was produced, and the cure followed.

There is no doubt of the powerful diuretic virtues of digitalin in dropsical diseases. In a case of anasarca following labor, and complicated with pericarditis and hæmaturia, it quickly produced a copious flow of urine, and the patient recovered. Several cases are related by M. Hervieux of dropsy accompanying valvular disease of the heart. Some of them were extremely aggravated by reason of the degree of cardiac derangement; but under the use of digitalin the breathing grew less anxious, or even became quite natural; habitual congestion of the face and head, with the accompanying headache, disappeared, and the patients were enabled to sleep quietly. At the same time, in all but very old and extreme cases, the dropsy was entirely removed, as well in those depending upon cardiac disease as in other cases.

Dr. Christison has remarked that the diuretic action of digitalin is never accompanied with albuminuria, and that sometimes, when albumen previously exists in the urine, it disappears, at least temporarily, under the influence of the medicine.

The proofs of the efficacy of digitalis and its active principles in the cure of dropsy might be much further extended, but the preceding are sufficient to illustrate the nature and the limits of its power. They harmonize with the results of experiments on healthy persons, and strengthen materially the conviction which these create of the stimulant, and even tonic, properties of moderate doses of digitalis when administered to persons suffering from loss of power and tone. In

¹ Works, ii. 110.

³ Bull. de Thérap., xlvii. 444.

Homolle, &c.

^{*} Med. Repert., i. 145.

Lancet, May, 1853, p. 428.

⁶ Month. Jour. of Med. Sci., Jan. 1855, p. 3.

dropsy, of whatever form, debility is the morbid element which calls for the exhibition of digitalis; and, with this qualification, the statement may be accepted that it is of all diuretics the most certain, and when it fails in dropsy there is little to hope from any other means.

Diseases of the Heart.—Writers upon this class of diseases have endeavored to determine with precision the particular cases to which digitalis is appropriate, and those in which it acts injuriously. They have, in general, arranged in the former class hypertrophy of the left ventricle, and in the latter dilatation of either the right or left cavities. This doctrine does not, however, rest upon observation, but flows rather from an hypothesis concerning the action of digitalis; the doctrine, namely, that it is a direct sedative, debilitating this organ and at the same time reducing the number of its pulsations. this explanation is altogether opposed to the numerous facts which show that the tendency of digitalis is rather to increase the energy of the heart's pulsations than to weaken them, even when their frequency is very much lessened under the influence of the medicine. The mere anatomical condition of the heart is a much less trustworthy guide to the use of digitalis than the alterations of its power and rhythm. When its action is irregular, tumultuous, and excessive, and the breathing panting or oppressed, and when, at the same time, the patient's condition is one of debility or exhaustion, digitalis may generally be used with advantage. But when such derangement of the heart and of the breathing occurs in a person of full habit and unimpaired muscular strength, the use of the remedy ought to be preceded by depletion, diet, and purging. There is one form of heart disease, however, in which it seems probable that the action of digitalis must be injurious, to wit, contraction, with deficiency of the aortic valves. Corrigan and several other writers have insisted upon this proposition. In numerous cases reported by them the symptoms appear to have been severely, and even seriously, aggravated by the medicine in sedative doses; the breathing was rendered more laborious, and the cough more urgent. It is not difficult to account for this effect. The disease becomes a cause of distress because the blood regurgitates through the aortic orifice into the ventricle; hence it seems but reasonable to suppose that whatever causes the heart to beat more slowly must allow the blood to flow back more freely into the ventricle, to distend it unduly, to paralyze it, and consequently to interrupt the circulation and the breathing. The natural mode of relief for the symptoms which this disease occasions is the frequent and free contraction of the ventricle; but digitalis, unless cautiously administered, renders its contractions less instead of more frequent, and therefore aggravates the evil instead of palliating it.

The conclusions of Dr. Munk' are not, in any essential point, at variance with the principles which have been here maintained. According to him, digitalis is seldom as advantageous in hypertrophy when simple, as when it is combined with other lesions of the organ, because the condition of tone contraindicates its employment, although the heart

BRAITHWAITE'S Retrospect, x. 60.

at the same time beat tumultuously. But in dilatation, with valvular disease of the organ and dropsy, it is of great utility by its diuretic as well as its indirect sedative influence. In a plethoric state of the system, he agrees with many other authorities that it is inoperative. Trousseau and Pidoux, on the other hand, recommend the medicine in hypertrophy, whether accompanied with dilatation or not, and disapprove of its use in simple dilatation, with signs of impeded circulation, such as coldness and cedema of the extremities, congestion of the face, &c. But this opinion is opposed to all experience, and rests upon a conjectural interpretation, as well of the action of the medicine as of the mechanism of diseases of the heart. Dr. Holland confirms the view which we have taken of the true indications for the use of digitalis in heart disease. He can find nothing incredible in the fact that it may under certain circumstances tend to produce intermittent pulsation, and yet under other circumstances correct the irregularity already existing. He points out the fact, which must now be regarded as established, that the large and flaccid heart is not, as on first view it might seem, the least favorable to the use of the medicine. And he compares the action of digitalis on an irregular heart to that of fever, which often restores a natural rhythm to a deranged pulse; thus implying his belief in the stimulant properties of the medicine. Conclusions almost identical with the preceding have been drawn by M. Beau from his clinical experience. He shows that, in organic disease of the heart, congestion of the face and of the jugular veins, puffiness of the eyelids, smallness of the pulse, dyspnœa, palpitation, and dropsy are symptoms produced by a want of power in the ventricles, and that if in such disease the pulse is frequent, its frequency is merely a sign of the struggles of the heart to compensate for the small amount of blood which it distributes, by the iteration of its contractions.' If, then, digitalis does—as we know that it really does—dissipate all these symptoms while it lowers the pulse, its action upon the heart must necessarily be that of a stimulant.

It is unnecessary to add new arguments to those now adduced in regard to the action of digitalis as a cardiac tonic, but it may be stated that prolonged experience confirms the justness of the doctrine. The current records of medical observation abound in proofs of its efficacy in the class of cases that have been described, and Dr. Fuller, whose authority in such questions as this will not be questioned, says: Digitalis "is a most valuable remedy in the treatment of dilatation, and is dangerous only when administered in hypertrophy. By stimulating the muscular tissue of the heart, it allays the irritability of that organ and moderates its action, whilst it augments the tone and contractility of the vessels, increases the flow of urine, and exerts a restorative and calming influence over the system which is not attainable by any other means." A few years ago it might have excited surprise that iron and strychnia-should be administered conjointly with digitalis; but it is now settled that these medicines, in appropriate doses, combine harmoniously to strengthen the enfeebled heart, not

¹ Abeille Méd., xiii. 33.

² On Diseases of the Chest (1862), p. 592.

distinctly marked, though necessarily less permanent. M. Decaisne has furnished an example of fungous growths in the uterine cavity occasioning profuse hemorrhage at the menstrual periods, which appeared to be entirely controlled by the use of digitalin, in the daily dose of six granules.²

Pulmonary Affections.—The practitioners of half a century ago, and even less, were profuse in their eulogies of digitalis as a cure of pulmonary affections, including consumption. Beddoes went so far as to say, "Were I to affirm that it cures three out of five cases of consumption, I think I should keep within the limits of truth." Dr. Hosack took a diametrically opposite, and a much truer, view of the subject, when he said of its indiscriminate use in this disease, "Digitalis is a finger which points to the grave." It may have been useful in certain chronic catarrhs of the lungs which would have been as readily cured by other means; and this forms the whole basis of a reputation which the physical methods of diagnosis effectually destroyed. There is, indeed, reason to believe that it was of service in the class of affections referred to. One even of the latest authorities, Neumann, asserts it to be, if not the only, yet decidedly one of the best remedies in bronchorrhœa. When the reports of its earliest favorers are closely scrutinized, nothing can be clearer than the conclusion that they were deceived, and that those who now interpret their language literally contribute to deceive readers of the present day. The cases of Kinglake,4 in which any benefit was derived from the medicine, were plainly examples of chronic bronchitis and chronic pleurisy; those of Fowler were of the same character precisely; and a like judgment must be pronounced on the reports of Beddoes and Drake. To give only one, but a conclusive, proof, among those which an analysis of the cases in question furnishes, of the non-tubercular character of the affections reported to have been cured, it may be remarked that in but two or three among them all is any mention made of hæmoptysis, the capital and least equivocal of the general signs of tubercular phthisis in the male sex. Besides, McLean expressly states that of patients treated some had "genuine phthisis, whose fatal course it is impossible to arrest," but the remainder were suffering from the consequences of neglected or ill-treated catarrhs.

It has been found that several of the most distressing symptoms of phthisis are amended by digitalin. The breathing becomes freer, and the headache less severe; the cough is palliated; the sleep is less disturbed, and the whole condition of the patient is ameliorated.

However erroneous the ideas which some physicians entertained of the curability of tubercular consumption by digitalis, the reports now referred to furnish unquestionable evidence of its utility in chronic bronchitis attended with fever of a hectic type, cedema of the limbs, and emaciation. They leave no doubt of its value in moderating the morbid excitement of the system, reducing the pulse, allaying the

¹ Med.-Chir. Trans., xxxix. 8.

Pract. Med., p. 582.

² Bull. de Thérap., lvi. 392.

BAYLE, Bibl. de Thérap., iii. 266.

cough, and lessening the perspiration, and in this manner preparing the way for a thorough cure by appropriate tonic medicines and

hygienic observances.

In 1853, M. L. Corvisart, having observed that a patient subject to spermatorrhæa, who was taking digitalin for nervous palpitations of the heart, was entirely freed from his infirmity while under the influence of the medicine, employed it in two other cases of the same affection, with complete success. The dose prescribed in each was a granule, containing of gr., twice a day. Subsequently M. Brughmans reported five cases demonstrating the efficacy of digitalis in this complaint, and in others requiring a state of repose in the virile organ, such as gonorrhoea, chancre, and other primary venereal According to him, it dissipates the swelling of the glans penis, of the prepuce, the urethra, the prostate, and the vesiculæ seminales, with "a certainty unparalleled in the effects of other therapeutic agents." He directed six or eight grains of digitalis to be given daily in divided doses.* A young man had suffered for twenty days with nocturnal seminal emissions, and his strength was completely exhausted; M. Laroche prescribed three granules of digitalin, and the

following night the pollutions intermitted for the first time.

Delirium Tremens.—The doctrine of the tonic action of medicinal doses of digitalis, which is maintained in this article, has received an unexpected confirmation from the results of its use in delirium tre-The discovery of its virtues in this affection was accidental, as that of the virtues of all medicines has hitherto been. Jones, of Jersey (Eng.), had prescribed a dose of laudanum and chloric ether to a patient affected with delirium tremens; by mistake, however, an ounce of tincture of digitalis was given instead. When he expected to learn that this error had proved a fatal one, he was no less surprised than pleased to find the patient very much better, and that, indeed, he rapidly recovered. Profiting by this hint, he began to give tincture of digitalis in doses of half an ounce. The first was not sufficient, which, however, it generally proved to be; a second equally large was administered in about four hours; and if a third was in rare instances required, it did not exceed two drachms. Under their influence, it is stated, the pulse became fuller, stronger, and more regular, the skin grew warm, and the cold clammy perspiration ceased. These effects were followed by a sleep of several hours' duration. No action on the kidneys was observed, nor any alarming symptom. Sixty-six out of sixty-seven cases recovered; the fatal case being one of tumor of the brain. So far as we can discover, the success of the remedy in the hands of other physicians has been almost uniformly equal to that of Dr. Jones. The only apparent exceptions to this statement are one or two reported examples of delirium tremens occurring after surgical injuries; but even in these instances the medicine did not appear to occasion either serious or alarming effects.

Gas. Méd.; and Times and Gaz., Nov. 1854, p. 473.
 Times and Gaz., Sept. 1860, p. 301.

Various Diseases.—Van Helmont used digitalis successfully as a local application to scrofulous tumors and ulcers, and several other writers report no less favorably of it. But it is alleged to have been still more useful as an internal medicine for the discussion of tumors, by Quarin, Darwin, Kühn, Parkinson, and others. Hufeland recommends it to be associated with mercury for the resolution of engorged glands. It was also vaunted in diseases attended with pain and nervous derangement, in spasmodic coughs, in convulsive and even in mental disorders, upon no better ground, it would seem, than a theoretical prejudice in favor of its depressing properties. An examination of the data contained in medical records, of its use in the above-named and kindred diseases, is far from lending support to the reiterated assertions of its efficacy. Cases may have possibly been relieved by its use, in which the spasmodic element rested upon that disorder of the nervous system which grows out of debility. Such a one, for example, may have been the case of epilepsy which Parkinson declares that it cured, although of twenty-six years' duration, and also those which are contained in a paper of R. W. Scott; but there is nothing in general experience of its use to encourage its exhibition in the disease in question.

External Use.—The outward application of digitalis to promote the resolution of enlarged glands has just been alluded to. It would seem to have been long employed for this purpose as a domestic remedy, both in England and Italy. A tincture of digitalis has been successfully used in dropsy, by bathing the affected part with it and wine of squills.3 Chrestien was also very successful in treating dropsy following scarlatina, and even intermittent fever, by frictions upon the abdomen with tincture of digitalis. M. Fallot reported three cases of ascites and general dropsy caused by suppression of the perspiration, and which were cured by fomentations of digitalis applied to the abdomen. He used an infusion of a drachm in a pint of water. Dr. Christison states that he has seen diuresis induced by rubbing on the abdomen a mixture of tincture of digitalis and soap liniment, and by placing on it cloths saturated with a strong infusion of the plant, in cases where the ordinary preparations of the medicine, as well as other diuretic remedies, had failed when given by the mouth. But this method is uncertain. In 1830 Dr. Gerhard employed digitalis endermically for the purpose of allaying the action of the heart.

ADMINISTRATION AND DOSE.—Many of the inequalities and seeming anomalies in the operation of digitalis are owing to the bad quality of the preparation employed. The instances are so numerous in which very large doses have been taken with but slight effects, or none at all, that it must be presumed that the drug was comparatively inert. This may have arisen from the leaves having been gathered while immature, from their having been too hastily dried, or from the fraudulent

¹ Murray, Apparat. Med., i. 733.

² Edinb. Med. and Surg. Jour., xxvii. 19.

<sup>Mérat and De Lens, Dict.
Bull. de Thérap., xliii. 512.</sup>

N. Am. Med. and Surg. Jour., x. 152.

⁴ BAYLE, op. cit., iii. 129.

VERATRUM VIRIDE. -- AMERICAN HELLEBORE.

DESCRIPTION.—American Hellebore is an indigenous species of veratrum, popularly known as swamp hellebore, meadow poke, Indian poke, itch weed, &c. It grows in all parts of the United States, east of the Mississippi, in damp and low situations. It has a stout stem several feet high, furnished with broad, oval, pointed leaves of a yellowish-green color, and its flowers are disposed in dense pyramidal panicles. The root, which is the officinal portion, consists of a thick, fleshy rhizome, tunicated above, fleshy below, and sending off numerous whitish radicles. It has a sweetish-bitter taste, and produces a persistent, acrid and burning impression upon the mouth and fauces, extending along the œsophagus even to the stomach. It yields its virtues to water and alcohol. Dr. Thayer, by treating it with alcohol, obtained from it a resin of a dark color, possessing the acrid properties of the root itself. A fluid extract was prepared by this gentleman by macerating the root in diluted and strong alcohol. It is of a dark brandy color, and each drop of it is estimated to be equivalent to a grain of the root. The officinal tincture is prepared by percolation with sixteen troyounces of the powdered rhizome to the production of two pints of tincture. The botanical affinities of the plant, and its action upon the animal economy, render it probable that its virtues are owing to veratria, the active principle of veratrum album. In 1859 Dr. Uhle, of Dorpat, analyzed a specimen of veratria sent from New York as the product of veratrum viride, and found it identical with that obtained from white hellebore.2 More recently, Mr. Scattergood isolated the active principles of the plant, and showed that it contains, besides veratria, a resinoid substance, of soft consistence, and a taste at first oily and nauseous but afterwards acrid.

HISTORY.—Osgood states that this plant was known to the aborigines as a poison rather than as a medicine, and he adds, on the authority of Joselin, that it was made use of by them in the election of their chiefs, the individual whose stomach was least susceptible of its deleterious influence being regarded "as the strongest of the party, and entitled to command the rest." It was also popularly used by the farmers of New England to catch or destroy the birds which ravaged their cornfields.3 It had long been employed by the late Dr. Tully, of New Haven, and other New England physicians, as a medicine, when attention was for a time particularly attracted towards it in 1835, by the essay of Dr. Osgood just referred to. It appears, however, to have been but seldom prescribed, when the emphatic proclamation of its virtues by Dr. W. C. Norwood, of South Carolina, in 1850, once more caused it to be generally employed, and to be eulogized with that extravagant ardor, and judged with that want of discrimination, which are apt to attend the introduction of all new medicines capable

¹ Bost. Med. and Surg. Jour., Aug. 1858, p. 77.

² Arch. fur. Phys. Heilk., iii. 404. ³ Am. Jour. of Med. Sci., xvi. 296.

⁴ Southern Med. and Surg. Jour., June, 1850.

of producing a marked, and, above all, an unusual operation, on the animal economy.

Action. On Animals.—It has been already mentioned that the farmers of New England have long been in the habit of resorting to green hellebore to protect their crops from birds. They scatter upon the ground corn soaked in a strong infusion of the root, and a short time after the birds devour it their muscular power becomes so much impaired as to prevent their flying or walking, and they are readily taken and killed. Unless caught in this condition, many of them recover and fly away. From experiments upon animals performed by Dr. Percy and Mr. Scattergood, the physiological effects of the alkaloid and the resin appear to have a very great similarity, viz: prolonged emesis, salivation, general prostration, and reduction of the pulse. But the resin produced a much greater reduction of the pulse than the alkaloid. There was no catharsis.¹

On Man.—In its local action, American hellebore is an active irritant. Its powder snuffed into the nostrils excites long-continued and violent sneezing, and, applied to the skin in a moist state, it produces redness and burning. From some experiments it appears in a slight degree to increase the secretion of urine. All observers agree that it is an emetic. Osgood found that two grains of the powder caused him to vomit, and observed that the act was at first unattended by nausea, and seemed to be performed by the contraction of the stomach and œsophagus alone. But in another person, who also presented this peculiarity, as well as in himself, emesis was subsequently persistent and violent, and attended with bilious ejections. Norwood speaks of it as one of the most certain and efficient emetics belonging to the materia medica, but also states that it often produces extreme nausea, as well as vomiting that is sometimes almost continuous. Yet he elsewhere describes the vomiting as full and free, with frequently little or no retching. A French physician, Robert, seems to imply by the terms of his narrative that the sedative operation of the medicine, to be presently described, is an effect of the nausea which it excites; but Dr. Norwood, and many others, declare that by its careful administration, nausea and vomiting may be avoided altogether. He states, indeed, that the pulse may be reduced as low as thirty-five beats in a minute, without the occurrence of either of these symptoms. In general, the excessive vomiting may be controlled by aromatics and diffusible stimulants.

However close the analogy may be between the effects of the present medicine and of white hellebore in other respects, there is one in which they have been alleged to differ so radically, as to prove, if the statement is true, that they do not owe their virtues to the same active principle. It is usually said and believed, that the latter agent is a violent irritant of the bowels, uniformly causing purgation when taken in large or poisonous doses. Of American hellebore Osgood said, "It has not the slightest laxative effect," and Norwood declares "it is not

² Bull. de Thérap., xliv. 415.

¹ Am. Jour. of Med. Sci., Apr. 1863, p. 529.

cathartic by any means." To these accounts most of the reporters subscribe; but we find that in a case published by Dr. E. M. Pendleton, there were "copious watery evacuations per anum," and in two cases, reported by Dr. E. Platt, that "profuse watery evacuations from the bowels" and "looseness of the bowels," are mentioned among the toxical phenomena; while in three cases, observed by Dr. Rayner, in which an infusion of white hellebore produced violent but not fatal symptoms, there was no purging. It is therefore certain that if an absolute difference exists between the two medicines, it is not to be found in their cathartic operation. At the same time it would appear that this effect is most usual with white hellebore.

The most remarkable quality of American hellebore is its sedative action on the pulse. Osgood was the first to state that by the exhibition of full doses, the pulse, when ranging from 75 to 80 in a minute, may be reduced to 35 or 40 in the course of a few hours, and become "small and creeping;" but Dr. Branch declares that "when used as it ought to be, it reduces the frequency but never the strength or volume of the pulse." Upon this point Dr. Norwood is not very explicit, but it may be inferred from his statements that he admits the reduction of force as well as of frequency in the pulse, since he describes among the ordinary effects of the medicine "great coolness of the surface and often icy coldness." Yet he does maintain that the reduction of the frequency of the pulse is not dependent upon the occurrence of nausea or vomiting.

The effects of this agent when given in an excessive dose have been described by Osgood, Pendleton, Platt, Colegrove, and others, in nearly the same terms. They consist of faintness, somnolency, or coma, dimness of sight, dilatation of the pupils, vertigo, headache, rarely delirium, impaired muscular action, general numbness, slow and infrequent respiration, hiccup, a pale cold skin covered with clammy sweat, persistent vomiting, excruciating pain in the præcordia, profuse watery diarrhoea in some cases, and a small, infrequent, and generally feeble pulse. Alarming and apparently dangerous as these symptoms are, it does not appear that they have terminated in death. On the contrary, they have generally been dispelled with facility by suspending the use of the medicine and administering diffusible stimulants. The effect of alcohol in counteracting the sedative action of the poison was shown in the case of a physician who took, by mistake, an ounce of the tincture at one draught. Extreme nausea, vomiting, and some dyspnœa, were the only evil consequences of this large dose. Neither in this case, nor in some others marked by extreme prostration, sedation of the heart, and vomiting, even of blood, were the bowels disordered.

This medicine is alleged to have produced abortion in the pregnant

Charleston Med. Jour., vii. 424.

Am. Med. Gaz., April, 1859, p. 249.

Pereira, Mat. Med., 3d Am. ed., ii. 184.

⁴ Charleston Jour., viii. 168. 5 Ibid., vii. 768.

<sup>Charleston Med. Jour., June, 1852, p. 423.
American Med. Gaz., April, 1859, p. 247.</sup>

Boston Med. and Surg. Jour., August, 1858, p. 96.

North American Med.-Chir. Rev., ii. 930.

More complete investigations of this point, and indeed of the whole

subject, are, however, still required.

Remedial Employment.—American hellebore has been more extensively employed in pneumonia than perhaps in any other disease, but an examination of the records is far from warranting the encomiums which have been lavished upon its virtues. The first to eulogize them was Dr. Osgood, in 1835, who says that the medicine has been advantageously employed, "except in low typhoid cases," while Dr. Branch assures us that it is best adapted to this very form of the disease—viz., adynamic pneumonia. An examination of the cases published by Drs. Robert, Livezey, Handy, Spalsbury, Chapin, Cutter, Toland, Watson, Murphy, and McGugin, shows that the opinions expressed by the reporters are not always sustained by the facts on which they profess to be founded. It must be confessed that when we meet with such general expressions as that the medicine "is invaluable in pneumonia;" that it may be considered "as much a specific in pneumonia as quinine is for intermittent fever" (Norwood); and when we find it said of pneumonia with rusty sputa that "its further progress was subdued" by the medicine; and when curative virtues are claimed for it in cases for which bleeding, calomel, tartar emetic, blisters, and senega were also prescribed, the only rational conclusion to be drawn from such statements is that they are of no value in solving the question of the utility of veratum viride in this Since these remarks were penned reports have been made from time to time setting forth the virtues of the medicine in sthenic inflammations, but particularly in that especially under consideration. But they are generally of a description which proves their reporters apt to attribute every favorable change in a disease to the last remedy administered. If it were true, as one asserts, that sometimes "its use is followed by such an immediate change in the character of all the symptoms, that the disease seems to be annihilated, as if by magic, and convalescence established at once," it would stand alone in the catalogue of medicines, the sole exponent of a medical thaumaturgy. Unfortunately, the negative or the opposite results of its use outweigh by far the flattering testimonials of its success. It should never be forgotten that pneumonia is a self-limited disease; that a comparison of various active and perturbative modes of treating it proves them to be all very nearly upon an equality as regards their curative power; and that the plan which has been attended with least mortality is, on the whole, one of pure expectation.

It is also said to be advantageous in pleurisy, but there is no sufficient evidence that it is so. In a case reported to demonstrate its value in this affection, depletion, calomel, and a blister dressed with mercurial ointment were first employed, and the veratrum having then been administered, the pulse indeed fell from 120 to 60, but the patient complained bitterly of distress, and hysterical symptoms super-

Bull. de Thérap., xliv. 416.

³ Ibid., Apr. 1857, p. 256.

⁵ Am. Jour. of Med. Sci., Oct. 1858, p. 311.

⁷ Ibid., p. 576.

² Boston Jour., Mar. 1857, p. 138.

⁴ Ibid., Mar. 1858, p. 113.

⁶ Ibid., p. 315.

⁸ N. Am. Med.-Chir. Rev., ii. 921, &c.

ACONITI FOLIUM.—ACONITE LEAF.

ACONITI RADIX.—ACONITE ROOT.

DESCRIPTION.—Aconite is a plant of the Nat. Ord. Ranunculaceæ. The principal species are four, A. anthora, A. lycoctonum, A. ferox, and A. napellus. They do not differ materially from one another in essential qualities, but the last only is officinal. It is a native of, or has at least long been cultivated in Europe, as an ornamental as well as a medicinal plant, on account of the great beauty of its dark-blue or violetcolored flowers, which are helmet-shaped, and arranged in a terminal spike or panicle. The stem is erect and simple. The leaves, which are palmate, deeply cleft, pinnate, and serrated on the edges, are of a fine shining green color, and when fresh have a faint narcotic odor. In their recent state, and also when dried, they have a bitterish, acrid taste, which is followed by a tingling sensation, and even soreness in the mouth and fauces, which subsequently, however, grow benumbed. The root is fleshy and fusiform, resembling that of the wild turnip (whence the name napellus, a diminutive of navus, navet, Fr.), and is furnished with fleshy fibres; it is three or four or more inches long, and of a coffee-brown color without and white within. In its taste and effects on the mouth it resembles the leaves. Sometimes several roots are joined together laterally. On being dried it shrivels, and grows Its active properties are most developed in the spring.

The properties of aconite depend upon an aconitia, an alkaloid, which is furnished by the whole plant, but most abundantly by the root. It is partially crystallizable, of a vitreous lustre, of a white color when pure, heavier than water, unchanged in the atmosphere,

and soluble in alcohol and ether.

A specimen of a root sent from China, as that from which the arrowpoison of the Chinese is procured, has been pronounced by Prof.

Christison to belong to a species of aconite.1

It is stated above that the effects of the non-officinal species of aconite do not differ materially from those of A. napellus. This has been fully shown, by the experiments of Schroff, to be true of A. ferox, which, however, exhibits these effects in greater intensity. The following preparations of aconite are officinal:—

Aconitia.—Aconitia.

Powdered aconite root is exhausted by alcohol, to which, after reduction, sulphuric acid is added. The solution having been freed of its oily and resinous portions by means of ether, the aconitia is precipitated by means of ammonia, re-dissolved by ether, and after decantation procured by evaporating the menstruum. As thus obtained, aconitia is a yellowish-white powder, without smell, and of a bitter, acrid taste, accompanied with a sense of numbness. It readily dissolves in alcohol, ether, and chloroform, but with difficulty in either cold or boiling water.

¹ Ediub. Med. Jour., Apr. 1859, p. 869.

² Jour. f. Pharmakodyn, i. 335.

periment with aconite amounted simply to this, that the animal experimented upon, a cat, lost the power of locomotion, was slightly convulsed, breathed slowly and laboriously, and so died. A minute and a half afterwards the heart was contracting regularly one hundred times in a minute. According to Pereira,' if a small quantity of the soft alcoholic extract of the root of aconite be introduced into a wound (as into the cavity of the peritoneum) in a dog, it usually causes vomiting (sometimes of a stercoraceous character), diminishes the force of the circulation, weakens the muscular system so as sometimes to cause the animal to stagger in walking, and destroys the common sensibility, without causing stupor. A dog under the influence of not a too strong dose, will sometimes follow its owner around the room, recognize him by wagging his tail when called, and yet be totally insensible to pinching, pricking with needles, &c. Slight convulsions sometimes occur just before death. The heart examined immediately afterwards does not pulsate (?). If too large a dose, in proportion to the size of the animal, be given, the phenomena detailed above are not witnessed, because death takes place so rapidly as to obscure the insensibility which depends directly upon the poison. Dr. Fleming noted essentially the same phenomena in his experiments.* When first introduced into the system, aconite produced weakness of the limbs and staggering, disordered breathing, paralysis and relaxation of the extremities, impaired general sensibility, blindness, slow and imperfect breathing, spasmodic twitching, and death. The heart was found to beat for some time after the death of the animal; the venous system was congested in all its parts. The results of twenty-five experiments performed by Dr. Robert Jackson on rabbits, cats, and dogs, differed in no respect from the foregoing; it is to be remarked, however, that the most rapid effects were observed after the use of the fresh juice of the root.³ From these experiments the force of the poison would appear to be expended upon the nervous system, attacking the organs of motility first, and then those of sensibility. The muscles of purely voluntary motion seem to be the first and principal, if not the only parts of the muscular system affected, if we may depend upon the uniformity of the phenomenon observed by Fleming and Brodie, and which are opposed to Pereira's observation, viz., the pulsation of the heart after the extinction of animal life.

On Man.—Among the earliest narratives which illustrate this subject, may be cited that of Matthiolus, who informs us that for the purpose of testing certain alleged antidotes he attempted (A. D. 1561) to poison four criminals who were under sentence of death, two of them at Rome and two at Prague. One only of the number survived, the rest suffered a more terrible death than hanging. The symptoms of one of the culprits who perished, occurred in the following order: Lassitude, prostration, a sense of sinking at the heart, which did not prevent the patient from speaking and seeing clearly; a cold sweat succeeded, and the pulse grew feeble; convulsive twitches of the lips

¹ Mat. Medica, &c., 3d Am. ed., ii. 1087.

² Month. Jour. of Med. Sci., 1845, p. 506.

⁴ Commentaire, p. 400.

³ Lancet, May, 1856, p. 478.

and eyes, and drawing of the head backwards, were followed by complaints of chilliness, looseness of the bowels, and vomiting, which seemed to afford relief; the man turned upon his side as if to sleep, but his face grew livid, and he was presently dead.

The most detailed account of the toxical properties of aconite is contained in the Inaugural Essay of Dr. Fleming, which received a gold medal from the University of Edinburgh at the graduation of 1844. His experiments and observations upon man were made in the Infirmary of the town just named. The following is an extract from his Treatise:—

"First Degree of Operation.—In the course of twenty minutes or half an hour, after the exhibition of five minims of the tincture of aconite, a feeling of warmth in the stomach is usually experienced, which is occasionally accompanied by slight nausea, and oppression of the breathing. After the lapse of thirty or forty minutes, this sense of warmth is diffused throughout the body, and in a few minutes more, is attended by numbness, tingling, and a sense of distension of the lips and tongue. There is also tingling at the tips of the fingers, and a peculiar sensation is felt at the roots of the teeth. The feeling of warmth soon subsides, but the numbness and tingling of the lips and fingers continue for a period varying from one to three hours. Slight muscular weakness is generally experienced, with indisposition for exertion either mental or corporeal. In about half an hour more the pulse is found to be diminished in strength; and in another hour both the pulse and respiration have become less frequent. Thus, a pulse which, in the normal state, beats seventy-two in a minute, will by that time have fallen to about sixty-four, and the respirations, supposing them to have been eighteen, to fifteen or sixteen.

"Second Degree of Operation.—Should a dose of ten minims be given at first, or the dose of five minims be succeeded in two hours by an other of equal amount, these symptoms supervene more rapidly and with greater severity. The tingling extends along the arms, and the sensibility of the surface is more or less impaired. In an hour and a half the pulse will probably have fallen to about fifty-six beats in the minute, and become smaller and weaker than before, still maintaining, however, perfect regularity. The respirations will have diminished to about thirteen, presenting, at the same time, a slow, laboring character. Great muscular debility is now experienced; and giddiness with confusion of sight comes on when the erect posture is assumed. The individual sinks into a lethargic condition, evinces great disinclination to be disturbed, although he rarely falls asleep, and complains much of chilliness, particularly in the extremities, which are cold to the touch. These phenomena continue in their full intensity from three to five hours, when they gradually disappear; a sensation of languor, which lasts for several hours more, alone remaining. This is the utmost extent to which I would recommend the physiological effects of aconite to be carried, in order to obtain, with safety and success, its therapeutic action.

"Third Degree of Operation.—On the administration of five minims more, two hours subsequent to the last dose, the sense of warmth,

and the numbress and tingling again spread rapidly over the body. The sensibility of the surface is still further diminished; lancinating pains in the joints are occasionally complained of; the headache, vertigo, and dimness of vision are aggravated; the countenance grows pale and anxious; the muscular feebleness increases; the voice becomes weak, and the individual is frequently impressed with the dread of approaching dissolution. Occasionally the pulse is reduced still further in strength and frequency, perhaps falling to 40 or even 36 beats per minute, but still maintaining its regularity. More frequently, however, it rises to 70 or 80, and becomes small, weak, and probably more or less irregular. The respiratory movements are also irregular, being either short and hurried, or deep and sighing. The surface is moist and still further reduced in temperature. Sickness may now come on; and, if formerly present, is much aggravated, and probably attended by vomiting. These symptoms do not entirely subside for one or two days.

"Fourth Degree of Operation.—On the administration of a fourth dose of five minims, two hours after the third, the symptoms assume a more alarming character. The countenance becomes pale and sunken; froth issues from the mouth, and the prostration increases. Some thus affected have stated that they felt as if dying from excessive loss of blood. Consciousness usually remains; or there may be slight wandering delirium, as occurs also after profuse hemorrhage. The voice is whispering, or is altogether lost. The pulse becomes still smaller, weaker, and more irregular; and the breathing more imperfect; the surface is colder than before, and is covered with a clammy sweat. I have seen patients recover from this state under the administration of pro-

per remedies.

"When the action of the drug is carried to a fatal extent, the individual becomes entirely blind, deaf, and speechless. He either retains his consciousness to the last, or is affected with slight wandering delirium; the pupils are dilated; general muscular tremors, or even slight convulsions supervene; the pulse is imperceptible both at the wrist and heart; the temperature of the surface sinks still lower than before; and at length, with a few hurried gasps, death by syncope

takes place."

From these experiments and observations the author infers that aconite is a sedative of the cerebro-spinal system, by its direct action upon the nervous matter, and on the heart, and by its indirect action on both, through the congestion to which it gives rise. In the action of aconite on the pulse, a distinction is to be made. The direct and immediate influence of the drug administered in small quantities is to reduce the frequency of the pulse, according to the author just quoted, to 60, 48, 40, and even 36; but if the sedative action on the system is allowed to proceed much further, the pulse rises in frequency, becomes irregular and intermittent, and smaller and weaker. The latter characters are ascribed to the pulse in nearly every case of fatal poisoning by aconite.

Several, and indeed most authors, mention a symptom which is scarcely alluded to in the narrative of Dr. Fleming's experiments, an

cases no examination of the body was made; in the three others there were no uniform lesions; the stomach was pale, or dark-colored, and the brain natural or deeply congested. The blood in the heart was liquid in two cases, and in the third its condition was not noted.

The operation of aconitia, when taken internally, differs from that of aconite only in degree and in the rapidity with which its effects arise. Reil dissolved 1\frac{3}{6} grain of aconitia in 200 drops of alcohol, and took from 5—30 drops (\frac{1}{6}—\frac{1}{4} grain), diluted with water, in gradually increasing doses. He experienced a feeling of fulness in the cheeks and temples, which by degrees was exchanged for a painful sense of tension, formication, and prickling; the temples throbbed, the head ached, the eyes felt strained, the pupils were dilated, the sight was obscured, there was oppressed and suspirious breathing, ringing in the ears, and increased urination. There was also a sense of heat in the stomach, with eructation, and, for three days following, nocturnal pollutions, to which the experimenter was not accustomed.\frac{1}{2}

The more detailed experiments of M. Hottot gave the following results. They were performed upon himself and two associates, and the dose of the medicine was gradually raised to one-twentieth of a grain. The effects of that quantity were summarily as follows: a sense of acrid heat in the mouth and throat which extended to the stomach and rapidly became more intense, and was attended by profuse salivation. Almost simultaneously was experienced general malaise, debility, and heaviness of the head; then nausea, gaping, oppression, formication in various parts, but chiefly in the face and extremities. By degrees the depression increased, and lancinating pains were experienced especially in the course of the nerves of the face, and the nausea was accompanied with vomiting. As muscular debility augmented, the formication was more decided, especially during rest; the limbs felt benumbed, the features tense and swollen; the pulse fell, the breathing grew slow and labored, and copious perspiration broke out. Still later the sense of exhaustion became extreme, and the least effort was painful; it became difficult to grasp anything; the mind remained clear, and there was no drowsiness. The pupils were dilated, but contracted readily in a strong light. These phenomena were of five or six hours' duration, and gradually gave place to natural feelings; but the last to be dissipated were the acrid taste, the heaviness of the head and the general muscular soreness and debility.

When this substance in ointment or solution is applied to the skin, it produces itching and prickling, followed by insensibility of the

part, and without reddening it in the least.

REMEDIAL EMPLOYMENT. Rheumatism and Gout.—In these diseases aconite was from the first employed by Stoerck, and his numerous imitators soon popularized its use throughout Europe. This author remarks that what chiefly gives merit to the medicine is the rapidity of its effects, for it will, in the space of a few days, not only alleviate,

² Annuaire de Thérap., xxiv. 51.

¹ Mat. Med. d. rein. chem. Pflanzenstoffe, p. 26.

constitution of the patient; a most important quality as every practitioner must acknowledge. Dr. Busse, of Berlin, has also witnessed its efficacy in rheumatism, and more recently we find singularly rapid cures of both acute and chronic rheumatism ascribed to it by Balfour.²

Aconite has been recommended in gout by most of the writers who have found it useful in rheumatism. It has been prescribed both locally and internally. There can be no doubt that in the former mode of using it aconite more than any other application is capable of mitigating the excruciating pains of gout. Internally, according to Ditterich, it produces a very decided amelioration of the symptoms; from the first day of its use the pulse is calmer and softer, the local heat is assuaged, and often a general sweat occurs by night, after which the color of the urine is lighter. The third or fourth day the swelling subsides, the tenderness of the joint has very nearly gone, and the urine resumes its normal characters. Royer-Collard, from experiencing the benefit of aconite in his own person, strongly recommended it in gout; but the fits, which were once regular, lost this salutary character, and brought on a long train of sufferings, to which the eminent patient at last succumbed. If, as has been supposed, the medicine be chargeable in any degree with this result, it still may be

employed locally without a fear of similar consequences.

Neuralgia.—In the treatment of this distressing affection, the benefits to be derived from aconite are unequivocal and precious. It is true that neuralgia is probably a symptom of various, and perhaps in other respects dissimilar, diseases, and is not uniformly cured, nor even relieved, by aconite; but its success is so direct and complete in many cases as to impart to it a decided value. Often it banishes the pain almost instantaneously, as well as permanently; but often, too, it only palliates the suffering of the patient, or puts an end to the present paroxysm without influencing the next. Undoubtedly the cases in which it most signally fails are those in which some previous local malady forms the starting point and cause of the neuralgia. While this remains, no permanent alleviation of the latter disease need be looked for from aconite. Cases illustrative of its anti-neuralgic virtues abound in the periodical literature of the profession. Mr. Curtis reports several cases of immediate and permanent relief from neuralgia of the fifth pair, and of the nerves distributed to the hip and thigh, from the external application of aconite; Tessier's several of the same sort cured by aconite given internally; Masius, Rademacher, and others, furnish similar accounts. Imbert-Gourbeyre prefers the inspissated juice of the plant preserved by alcohol, and ascribes to it almost magical powers; and Dr. Stevens, of Cincinnati,

^{*} Annuaire de Thérap., 1852, p. 46. Compare, also, Andrea, Comment. de Re. Nat. et Med., xvii. 669. Barthez, in his Traité des Maladies Goutteuses, states that he has often seen aconite dissipate the disease even in obstinate cases, and quotes Schenck-bucher, Quarin, and Van Swieten to the same purpose.

Lancet, 1840-41, ii. 474. See, also, Bades, Abeille Med., Oct. 1845.

Bull. de Thérap., xxxiii. 105. DIERBACH, loc. cit.

⁷ Abeille Méd., xii. 21.

useful. Several cases of recovery from traumatic tetanus have been reported in which aconite was the principal medicine exhibited. The immediate effects of the medicine were such as to render its share in the cure doubtful. The list of diseases for which aconite is alleged to be a palliative or a cure might be greatly extended, but in nearly all the published narratives the proof of its efficacy is far from satisfactory, or, if accepted, only shows it to be inferior to other medicines belonging to the class of narcotics.

ANTIDOTES.—Besides diffusible, and especially alcoholic, stimuli and opium, which have been used with success in poisoning by this

drug, strychnia has been employed with advantage.

Administration and Dose.—Aconite may be given in substance, extract, or tincture. Of the powdered leaves one or two grains may be used as a minimum dose; of the extract from half a grain to one grain; and of the tincture of the leaves twenty or thirty drops. these preparations possess inferior qualities to the tincture of the root, which should be prescribed in doses not exceeding, at first, three minims, and repeated three times a day. If, as the medicine is continued and the dose gradually augmented, there should arise nausea, numbness, and tingling of the lips, muscular weakness and infrequency of the pulse, it would be prudent to suspend it, and administer stimulants. Sometimes the medicine disagrees with the stomach and bowels, and occasions vomiting and diarrhoea. A small piece of dense sponge, fastened upon a suitable handle, may be used to apply the tincture of aconite externally. The finger would be preferable were it not for the benumbing influence of the fluid upon the skin. It may be used if protected by the finger of a glove.

Aconitia may be applied in an ointment made, according to Dr. Turnbull's formula, of two grains of the alkaloid to sixty grains of lard; or in alcoholic solution, in the proportion of half a grain to one fluidrachm of the menstruum, and the proportion increased until tingling of the skin is produced. This preparation, owing to its uncertain strength, and fatal effects in an overdose, ought never to be admi-

nistered internally.

CONIUM.—HEMLOCK.

DESCRIPTION.—The leaves and seeds of Conium maculatum are officinal, but the whole plant contains a peculiar principle, conia, on which its medicinal activity depends. Conium is a plant of the natural order of umbelliferæ; and is a native of Europe, but is naturalized in the United States. It bears a general resemblance to parsley, has a white, fleshy, fusiform root, and an erect, herbaceous, and branching stem, from three to five feet high, smooth, and of a bright green spotted with purple, whence the name maculatum applied to the plant. The leaves are pinnate, with incised leaflets of a deep green color above, but paler below. The flowers are white, disposed in numerous compound terminal umbels, and the seeds, or fruit, are double, of an

ovate form, the two portions adhering by the base, and are ribbed longitudinally on their convex surface.

The whole plant exhales a strong and fetid smell, which has been

compared to that of musk, of copper, of mice, and of cat's urine.

Conia, when pure, is a yellowish, oily-looking, transparent liquid, lighter than water, of a penetrating smell, resembling the combined odors of tobacco and mice, and of an acrid, nauseous, and tobacco-like taste. It is very volatile, is slightly soluble in water, but less in warm than in cold water, and readily dissolves in alcohol, ether, and fatty and essential oils. Its reaction is alkaline, and with acids it forms combinations which crystallize with difficulty, and are very soluble in water, and extremely poisonous.

The following preparations of conium are officinal:—

Extractum Conii.—Extract of Hemlock.

It consists of the juice of the plant reduced by gentle evaporation to a proper consistence.

Extractum Conii Alcoholicum.—Alcoholic Extract of Hemlock.

It is made by exhausting powdered hemlock with alcohol by percolation and evaporating the product to a proper consistence by a gentle heat.

Extractum Conii Fluidum .- Fluid Extract of Hemlock.

It is procured by exhausting sixteen troyounces of powdered hemlock in a percolator with a mixture of acetic acid and diluted alcohol, and evaporating, at a moderate temperature, to the production of one pint of tincture.

Tinctura Conii.—Tincture of Hemlock.

Lib. vi. cap. xi.

It is made by percolation with four troyounces of powdered hemlock and alcohol so as to produce two pints of tincture.

MEDICAL HISTORY.—Hemlock was well known in ancient times, although it does not appear to have been used as an internal medicine until very recently. It is familiar to scholars as the agent of certain governments for destroying political offenders, and, indeed, the clearest description of its effects that has reached modern times is contained in the narrative of its most illustrious victim's death. "Socrates, after swallowing the poisoned cup, walked about for a short time as he was directed by the executioner; when he felt a sense of heaviness in his limbs he lay down on his back; his feet and legs first lost their sensibility, and became stiff and cold; and this state gradually extended upwards to the heart, when he died convulsed." This description contains substantially the symptoms ascribed by Dioscorides' to poisoning by hemlock, viz., vertigo, confused vision, hiccup, disturbance of the mind, cold extremities, and at last convulsions. Paulus Ægineta adopts this account literally, but Nicander adds to it "a sense of suffocation."

Many doubts have been entertained whether the Athenian state poison was in reality hemlock, and not some variety of cicuta, but

ADAMS, Comment. on Paulus Ægineta, ii. 212; Lancet, 1837, p. 612.

several considerations appear to sustain the more commonly received opinion. On the one hand, the failure of hemlock and its preparations to produce poisoning, or, indeed, any sensible phenomena, only proves that they who witnessed such failures must have experimented with an inert substance; and, on the other hand, the stronger the preparation of the drug employed by other experimenters the more nearly did the phenomena resemble those recorded above. Dioscorides himself also declares that the powers of the plant differ very much according to its locality, and he mentions Athens as one of the places where it is most powerful, and Matthiolus states as a notorious fact that the Italian is inferior to the Greek conium.' A modern writer, Dr. Sibthorp, found C. maculatum growing most abundantly between Athens and Megara, but neither Cicuta virosa nor other analogous plants, whose effects might be mistaken for those of the spotted hemlock, were to be discovered in that region.2 It may be added that this plant is called zώνιων by the modern Greeks, and that the discutient and sedative virtues ascribed to conium in modern times were also thought by ancient writers to belong to it.

It appears that, as different localities in Greece produced conium of unequal degrees of strength, so, in general, that which grows in the northern countries of Europe is very much feebler than the southern plant. This circumstance must be added to the others which explain the want of uniformity in the results of experiments made to test the virtues of conium, and the conflicting opinions respecting it of authors

both ancient and modern.

Dioscorides directs that the juice should be obtained from the stalks and seeds before they are withered, and that it should be dried in the This latter direction is of importance, for a very moderate degree of artificial heat decomposes and drives off the conia which they contain. The same author recommends conium as an anodyne for all pains, and as useful in erysipelas and phagedenic ulcers. The bruised plant he directs to be applied upon the genitals as a remedy for nocturnal pollutions, and upon the breasts of girls to prevent the development of these organs. Pliny makes almost identical statements, and Avicenna and Serapion propose a hemlock plaster to resolve tumors of the mammæ and testicles, and to restrain the secretion of milk.3 In more modern times, several authors, among whom may be mentioned Ettmüller, Paré, Ray, and Lemery, extol this plant, especially when bruised and applied in the fresh state to scirrhous and other tumors. Rénéaulme, a physician of Blois, gave it internally to remove visceral "obstructions." Wyer, de Heers, and Rathlaw, in the seventeenth and eighteenth centuries, employed conium in venereal and other cutaneous affections, but it was not until Stoerck, in 1760, published his treatise on the subject that it was much used as an internal remedy, nor all the advantages known that could be derived from its external In the first essay of the author just named numerous cases are reported of scirrhous tumors, chronic abscesses, and ill-conditioned ulcers cured by extract of conium, and in the second he affirms its

¹ Comment., lib. iv. cap. 74.

BAYLE, op. cit., iii. 559; MURRAY, op. cit.

² Pereira; Mérat et De Lens.

⁴ SPRENGEL, Hist., &c., v. 475.

inducing universal muscular spasm of a tonic sort, the former brings on asphyxia by paralyzing the respiratory as well as the purely voluntary muscles.

No poison, except prussic acid, excels conia in the subtlety and rapidity of its operation. A drop placed on the eye of a rabbit killed it in nine minutes; by a like application of three drops, a strong cat was destroyed in a minute and a half; and five drops, placed in the gullet of a small dog, caused its death in one minute. Introduced into the veins, the fatal effect was almost instantaneous.

It will be observed that the symptoms to which conia gives rise are different from those produced by conium, in being much simpler and much more like what are ascribed to the Greek poison. Whether this depends upon the fact that the Athenian hemlock contained a larger proportion than the Western European of conia, or whether a second poisonous element is united with this principle in the plant, is at present uncertain, but the former supposition seems the more probable.

On Man.—In such doses as are requisite to insure its alterative action, conium occasions no sensible phenomena, and hence the best evidence of its action is furnished by the subsidence of the disease for which it is administered. But as, owing to the very uncertain strength of its preparations, it is necessary to increase the dose of conium until some proof of its activity is obtained, it is expedient to know the various phenomena which have been observed. Of these the most important are now to be detailed. One of the earliest signs of its operation is an increase and viscidity of the urinary secretion, and sometimes the perspiration is augmented. The urine is said to be more abundantly secreted, to smart a little when passed, and on standing to deposit a glairy sediment, and to exhale a nauseous smell; but these effects are by no means constant, nor is vomiting or diarrhoea, both of which at times occur if a large dose is given at the outset. But in the absence of these symptoms, or after they have subsided, the continued use of the medicine seems to exert a tonic operation; the appetite grows stronger; the bowels, after having been constipated, become regular; the skin assumes a more wholesome aspect, and the patient gains flesh and strength. It is during this grade of action, continued for a long time, that several of the characteristic effects of conium are developed, such as the wasting of the mammæ and testicles, and of various glandular tumors, and the loss of venereal desire, effects which the ancients, as has already been mentioned, produced by the external application of the fresh plant, and which the experience of several modern writers has shown to be real.

A somewhat larger dose than suffices to produce the alterative action which has been described, gives rise to more appreciable symptoms. The pulse becomes somewhat slower and fuller, there is a papular or erythematous eruption, with itching of the skin, injection of the eyes, dryness of the throat, acute pains and slight spasms, a sense of fulness in the head, and loss of power in the extremities, some cloudiness of the sight, giddiness, and sometimes copious diaphoresis. One or more of these symptoms may be present, but it is rarely that they all concur in the same case. In fact, they are more apt to be

whilst sitting, little or no apparent effects of the poison remained. On rising, however, the inferior extremities persisted in their unwillingness to move; but much less so than before. The whole day passed away without my being entirely rid of these feelings, and it was not until I enjoyed my usual sleep that perfect vision was restored. I will observe that the intellect appeared unaffected, the bowels and kidneys were not disturbed, neither was any soporific effect produced."

A very similar train of symptoms is related by Whyte' of himself. "In a little more than half an hour after swallowing fifteen or twenty grains of the extractum cicutæ, I have often been affected with a weakness and dazzling of my eyes, together with a giddiness and debility of my whole body, especially the muscles of my legs and arms; so that, when I attempted to walk, I was apt to stagger like a person

who had drunk too much strong liquor."

John Hunter relates that in a case of phagedenic ulcer resulting from bubo he administered extract of hemlock in doses gradually increased to two ounces and a half a day. "It produced indistinct vision and blindness, loss of voice, falling of the lower jaw, a temporary palsy of the extremities, and once or twice loss of sensation," but nearly cured the disease. Some time after having suspended its use the sores reopened in consequence of some irregularities of diet, and the patient of his own accord took ten drachms of conium in one morning. This produced "great restlessness and anxiety; he dropped insensible from his chair, fell into convulsions, and expired in two hours."

In a still higher grade of its influence, conium often gives rise to essentially the same symptoms that have been detailed, and they may even terminate in death. An illustration of this statement is to be found in a case reported by Dr. Bennet.³ A poor tailor, named Gorr, ate for dinner some vegetables prepared by his children. Half an hour afterwards he left his house, but staggered in walking. reaching another house he faltered in his gait, and sat down hastily. He conversed sensibly, drove a hard bargain in selling some trifles, did not complain of pain, and was not at all excited. His face was very pale. He rose from his chair with difficulty, and staggered out of the house and through the street, but was soon obliged to sit down. A policeman who came up thought him drunk, but Gorr told him where he lived, and asked to be taken home, adding that he had lost his sight and the use of his limbs, and indeed he was quite unable to stand. He was conveyed to the police office, and here again correctly A physician soon saw him—about two hours and gave his address. a half after the ingestion of the poison—and found him sensible, but unable to speak, completely paralyzed in all his limbs, and with occasional spasmodic movements of the left leg. His pulse and breathing were natural. About half an hour later the heart was very feeble, the pupils were fixed, and life was soon extinct. On examination of

On the Nature, &c., of Nervous Disorders (Edinburgh, 1765), p. 22.

² Hunter's Works (Am. ed.), ii. 234.

Bdinb. Med. and Surg. Jour., July, 1845.

spasms in the extremities, especially in the lower, and, in fatal cases, death by paralysis of the respiratory muscles; the action of the heart being but little affected, and the mind remaining clear to the last. Kölliker thus sums up the results of his experiments with conia, "it produces paralysis of the nerves of motion, but leaves the brain and nerves of sensation unaffected." These symptoms are precisely such as are recorded of the death of Socrates. When Dr. Bennet, on reporting to the Medico-Chirurgical Society of Edinburgh the case which has been quoted from him, drew attention to this identity of the phenomena in the most ancient and the most recent example, and inferred that the Athenian poison must have been derived from conium maculatum, Dr. Christison observed "that he was inclined to adopt this conclusion; and he felt the more pleasure in stating this, because he had formerly expressed a different opinion." We may now repeat, with Dioscorides, "conium is fatal by its coldness;" that is, by its power of depressing and paralyzing the system.

It is very difficult, if not quite impossible, after this review, to admit conium to have been the poisonous agent in several cases which have long been referred to as illustrations of its effects. Such is the often quoted instance of the vine-dresser and his wife, who, having eaten some hemlock-roots for supper, awoke after the first sleep, and began to run wildly about the house, bruising one another and themselves against the walls; that also of two priests, who, in consequence of eating hemlock, became raving mad, imagined they were geese, and plunged into the water; such are others by Ray and Watson, in which vertigo, raving madness, epileptic fits, convulsions, and coma preceded death; and such, finally, the case related by Bergius of some children who, after eating the hemlock root, were seized with intoxication, vertigo, great heat and pain in the stomach, convulsions, hemorrhage from the ears, trismus, singultus, violent ejaculation of the urine, and retching, and so died.7 The symptoms in the last case resemble those of poisoning by cicuta virosa, and in the previously quoted cases the phenomena have a strong analogy with such as are produced by ænanthe crocata, or hemlock dropwort.

REMEDIAL EMPLOYMENT. Cancer.—Conium had long been used as an external application in the treatment of this disease when Stoerck published his account of its remarkable curative powers as an internal remedy. He also at first employed the plant externally as a fomentation for various tumors and ulcers, and from witnessing its good effects was led to prescribe it internally in the form of an extract. In 1760, this author published fifteen cases described as "scirrhus" or "cancer," of which he affirmed that thirteen were cured and the remaining two improved. There must have been great self-deception or else exaggeration on the part of Stoerck, for such results as he reported have never since been obtained; yet we are none the less in-

¹ Virchow's Archiv., x. 238.

^{*} MATTHIOLE, Comment., liv. vi. chap. xi.

⁴ Wibmer, Wirkung der Arz., ii. 172.

[•] Ibid.

⁸ Compare TAYLOR on Poisons.

² Month. Jour. of Med. Sci., June, 1845.

⁶ Beck, Med. Jurisprudence, ii. 630.

⁷ Sigmond's Lectures.

⁹ Translated by John Andres, M. D.

use of the medicine, and states that the only benefit he has effected by its administration in the uncombined state has been alleviation of pain and irritability, especially in cases of cancer of the stomach.¹ Devay asserts that he has resolved engorgements of the mamma having all the characters of atrophic scirrhus by means of this medicine. He commenced by giving the powdered seeds in doses of one-sixth of a grain twice a day, and increasing daily by the same proportion of a grain. This author estimates the dose of conia at one-hundredth of that of conium.³ Reil, in the same disease, gave one-twelfth of a grain of conia every three hours, and found that it decidedly soothed the pain. In a case of induration of the mamma from injury, it appeared to remove the tumor.

Scrofula. Glandular Enlargements. Eruptive and Ulcerative Diseases.—The much more efficient preparations which are now in general use render it unnecessary to dwell at length on the employment of conium in scrofula. Fothergill, Rutty, and Farr,3 attribute to it antiscrofulous virtues, but Vogt has pointed out with more precision the conditions under which it is useful. Thus, he affirms that while the medicine may be relied upon in scrofula of the skin and external lymphatic glands, and in the cutaneous eruptions and indurations that affect persons of light complexion, delicate skin, and irritable temperament, it is not advantageous in those forms of the disease in which cachexia and an inflammatory tendency of a low grade are combined, producing emaciation, debility, dyspepsia, &c. Indeed, it is not to be thought of in such cases, except in conjunction with bark and iron. Mere scrofulous suppuration of an acrid or ichorous description, even with some hectic fever, is not in itself a contraindication to its use. A somewhat analogous view is given by Neumann, but he restricts still further the agency of the medicine to scrofula of vascular organs, and praises it especially in strumous ophthalmia. Dr. Baudelocque, Physician to the Children's Hospital in Paris, reports very favorable results in the cure of five out of seven cases of children affected with enlarged and ulcerated glands with fistulous sinuses, abscesses, &c. He prescribed an alcoholic extract of conium in gradually increasing doses until the specific symptoms appeared, which he maintained in a slight degree for a week or more. Once a week each patient was purged. A child with scrofula of the bones derived no advantage

Under the indefinite title of obstructions authors have described a variety of affections as being cured by conium. Some of them were evidently scrofulous, others appear to have been simple hypertrophy, and others enlargement with interstitial fibrinous deposit, especially of the secernent glands. Tumors of the liver, the mesentery, the uterus, the mamma, and the stomach, were among the affections alluded to. In the cases of jaundice which this medicine is reported to have cured, the result must, in all probability, be attributed to its power of promoting

Loc. cit. sup.

On the Nature and Treatment of Cancer, p. 195, Lond. 1846.

Bull. de Thérap., xlii. 529.

Heilmittellehre, p. 200.

Ibid.Bull. de Thérap., ix. 126.

⁷ Thacher's Dispensatory.

the absorption of the adventitious substance which invaded the liver and prevented the escape of the bile from its acini and ducts. Gataker, Wenzel, Recamier, and Dufresnoy, are quoted by Eberle as certifying to its efficacy as a deobstruent. Trousseau assures us that by the long-continued use of conium poultices to the belly he cured two cases of ascites, the one dependent upon chronic peritonitis, and the other on several tumors in the abdomen. The cure was accomplished in three months, and in the last-mentioned case the tumors disappeared entirely. The mammary gland has been known to cease secreting and to become atrophied under the influence of conium. D'Outrepont relates cases of the sort, and even asserts that the breasts will never again secrete milk. This opinion, indeed, was held anciently, for plasters of conium were directed by Avicenna against the secretion of milk, and, according to Guersent, the drug given internally has produced a like effect. Richter recommends it for the

same purpose.

The most interesting cases of mammary disease cured by conium are those of Dr. S. W. Williams, of Deerfield, Mass.³ Some of them are indeed reported as cancerous, but admitting it to be doubtful that they were really so, it is still certain that they afford strong evidence of the curative powers of conium. Where the tumor had not ulcerated, it is described as indurated, knotty, and discolored; where it had advanced to ulceration, there was in one instance induration, abscesses, sinuses, fungi, and a discharge of sanious pus. Another case is described as "real open cancer." "There was an open, ragged ulcer nearly the size of the palm of the hand. It was discharging a thin, ichorous, and highly offensive matter, in large quantities, and occasionally blood. It had somewhat the smell of old brass or copper when exposed to heat and moisture. The edges were jagged and callous, and the whole breast was of scirrhous hardness. It had been open for several months, and there had been an induration in the breast for several years. The constitution was much affected, and the pain in the breast intolerably severe. The stench was so great that the attendants of the patient could not stay with her." In this and the other cases which were perfectly cured, the treatment consisted in the application of a poultice of carrots or of the pond-lily sprinkled with the powdered leaves of conium, and the internal use of the extract of conium, of which the dose was gradually increased until constitutional symptoms were produced. Six cases are reported by Dr. W., of which all got quite well but one, which ended in death.

Other examples of the curative power of conium in "corrosive and malignant" ulcers are to be found, and they deserve to be remembered at the present time, especially when a resort is had to surgical operations with perhaps undue alacrity. Two cases are reported by Rutty, in one of which the sore extended from below the eyelid to the angle of the mouth, and in the other from the ear to the lip and the nose, destroying a part of each; the discharge from both was sanious

³ Am. Jour. of Med. Sci., ix. 77.

¹ Am. Jour. of Med. Sci., viii. 491. ² Dict. de Méd., en 60 vol., art. Cigüe.

vol. 11.—18

and fetid. Both were cured by conium in doses gradually increased until its characteristic intoxication was produced.¹ Sir Everard Home, in his tract on tumors, observes, that many which were formerly by violent applications rendered true cancers, now never take on the disease. The treatment he employed was the internal and external use of conium, and he states, in proof of its efficacy, that in some cases where the medicine was left off the symptoms became more violent, and, when it was resumed, abated.

Cutaneous Diseases.—Those which are connected with a constitutional scrofulous taint are said to be most amenable to the influence of conium, and instances are not wanting in which it appears to have been curative. An author, quoted by MM. Trousseau and Pidoux, Fantonetti, has published cases which show that baths of the infusion of conium are very efficacious in the treatment both of chronic and acute diseases of the skin. The day before the bath is to be given, this writer directs eight or ten handfuls of conium to be infused in as many pints of water, which, at the proper time, is poured into a bath kept at a temperature of about 90° F. The patient should bathe for an hour or two, and be protected from breathing the vapor by a sheet covering the bath-tub and passed around his neck. The share of the warm water is not to be overlooked in estimating the value of this treatment. In tinea capitis a decoction of hemlock leaves has been used with perfect success.

Diseases of the Nervous System.—A valuable application of conium was introduced a few years ago by the late Dr. Woodward, Superintendent of the Massachusetts Insane Hospital. In some form of melancholy, and especially in chronic disease of the stomach and digestive organs attended with uneasiness, restlessness, watchfulness, and nervous pains, it often affords great relief, and is an auxiliary in accomplishing a cure. A lady, under the care of Dr. W., was in the deepest melancholy, imagining that she had a hole in her stomach, and that all the food she took was impacted in her abdominal cavity. Her menses were suspended, and she had a uterine tumor as large as a quart bowl. After using for some months extract of conium with carbonate of iron, her delusion vanished, her menses returned, and the tumor gradually diminished, and finally disappeared.

Conium has been regarded by some writers as anaphrodisiac; such was the opinion of Aretæus and others among the ancients. St. Jerome states that the Egyptian priests controlled their sexual passions by drinking every day a potion of which hemlock was an ingredient. Bergius, on the other hand, relates a case in which this medicine restored one who was impotent, and Stoerck, after citing a like instance, protests against its being thought liable in any wise to abate the virile powers.

In neuralgic and rheumatic affections, but especially the former,

¹ Med. Obs. and Inq., iii. 237. See also Douglas, ibid., 113; and BAYLE, tom. cit., 622.

² Valentin, Med. Repository, vi. 377; Trousseau and Pidoux, &c.

^{*} Annual Report of the Mass. State Lunatic Hospital, 1845.

⁴ Guersent, Dict. de Méd., v. 212.
5 Stoerck, On Hemlock, 2d Essay.

fatal sedation. Warm oil, with a small portion of ipecacuanha, may also be employed. Bloodletting, which is also recommended, probably on account of the supposed congestion of the cerebral vessels, has no experience in its favor. The ancients regarded wine as the proper counter-poison of conium. Mercurialis says: "Sicut cicuta homini, sic cicutæ vinum." Dioscorides advises the same remedy after the evacuation of the stomach by emetics, and of the bowels by clysters, and further directs milk or whey to be administered along with aromatic stimulants. Matthiolus adds to these precepts that the patient should be kept warm, and in motion as much as possible. Indeed all the ancient authorities agree in the opinion that stimulants are the essential remedies for poisoning by hemlock, and the same treatment has been revived by physicians of the Italian school, who direct wine, brandy, and other agents of the class of diffusible stimuli.1

ADMINISTRATION AND DOSE.—Conium may be given in substance; the expressed juice, the extract, and the tincture are preferable forms. The dried leaves are, in general, quite inert, and ought not to be depended upon unless very recently gathered. The dose is from one grain upwards. Of the extracts from one to two grains may be prescribed for the first dose; of the fluid extract about five minims; and of the tincture, which is an ineligible form on account of the quantity of alcohol that must be taken as the doses are augmented, half a fluidrachm. But, whatever form is preferred, the dose of the medicine should be gradually but rapidly increased until unequivocal symptoms of its operation are manifested; then, and not before, should the daily increase of the dose be suspended or diminished. In no other manner is it possible to have assurance that the preparation employed is really active. Conia, on account of its tendency to decomposition, is recommended to be mixed with twice its volume of muriatic acid, and excluded from the light. Its maximum dose is stated to be one grain (Van Praag), but the average dose is generally said to be from Too to 25 of a drop.

The conium plaster is used upon indurated, swollen, or painful parts, but its efficacy, beyond what is due to the general excitation it maintains on the spot where it is applied, may well be questioned. It is made by melting together yellow wax lbj; rosin and sweet oil, of each lbss; and to this, when half cold, is added powdered hemlock lbj.3 It is not officinal, and should not be confounded with the plaster of hem-

lock (Pix Canadensis).

Sobernheim, op. cit.

Hemlock cataplasms, made with the fresh plant bruised, or, in default of this, with the extract or ointment laid upon the surface of emollient poultices, are not to be neglected in those forms of external disease in which this medicine has been recommended for internal use, and especially in malignant and foul ulcers. Conium baths may be directed in cases of rheumatic and cutaneous disease.

¹ Annales de Thérapeutique, iv. 75.

² Dr. Garrod states that he found it necessary to administer the best London tincture in doses of from half a fluidrachm to a fluidounce in order to obtain any appreciable physiological effects. (Times and Gaz., Feb. 1864, p. 168.)

The head and tail were more or less bent upon the spine. The animals seemed to have lost all sensibility; they could be moved, struck, or cried at without betraying the least consciousness. There was foam upon the lips, the tongue and gums were livid, the conjunctiva injected, the breathing hurried and labored, and sometimes there was a discharge of urine and fæces. This state was of two or three minutes' duration, and was succeeded by alternate paroxysms and quietness until death took place, which was generally about half an hour after the poison was administered. Nothing peculiar was discovered on examining the bodies of the animals. From the experiments performed by him, M. Orfila concludes: 1. That powdered cocculus is poisonous to dogs. 2. That, like camphor, it acts upon the nervous system, and principally on the brain. 3. That its active principle is picrotoxin. 4. That vomiting is the best antidote to its effects.

Dr. Glover's administered to an ass one hundred and twenty grains of picrotoxin, and an hour afterwards, one hundred grains more. The dose had hardly been administered for a few minutes, when the animal salivated profusely; she then began to strike the ground with her fore feet. The breathing became laborious; she suddenly ran backwards for at least twenty paces, fell on her side, and expired after a terrible

fit of tetanus which lasted for about five minutes.

A pigeon had ten grains of picrotoxin put under the skin of the axilla. In fourteen minutes, convulsive backward movements of the head and neck were observed. At the sixteenth minute, the animal vomited from its crop; strange motions of its feathers, very difficult to describe, occurred; it seemed as if they were agitated in all directions. The animal fell on its side, in which position, by movements of one wing it contrived to turn itself round in a circle, as if rotating on a pivot. This lasted for several minutes. It exhibited, also, spasms of opisthotonos, and picked at the ground with its bill.

A small gold fish was put into a dish of water with five grains of picrotoxin. In half an hour the fish seemed excited; it sprang twice out of the glass; it then gradually lost the power of keeping the belly vertical and inclined sideways. In about forty-seven minutes it could be taken out of the water without struggling; it gradually lost the power of motion, and in about six hours was dead. In several of Dr. Glover's experiments, the animal temperature was greatly elevated.

The experiments of Drs. Bonnefin and Brown-Sequard led them to several conclusions, of which the most interesting is that, "picrotoxin does not appear to excite convulsions directly or by stimulation, but indirectly, or by increasing the reflex power of the cerebro-spinal axis." Thus, for example, if the brain and medulla oblongata be removed from a frog, annihilating its power of voluntary motion, it remains quiet under the influence of picrotoxin so long as it is undisturbed, but, if stimulated, is seized with irregular convulsive movements, and tetanic rigidity. The same phenomena were produced in a guinea pig.³ Such effects are closely analogous to those of veratria.

¹ Toxicologie, 5ème éd., ii. 648.

² Month. Jour. of Med. Sci., April, 1851.

Par F. W. Bonnerin, 1851.

Dr. Taylor states that "it is employed by unprincipled brewers for adulterating porter, being unblushingly recommended by Childe and by Morris in their books "on Brewing." It is said to prevent the

secondary fermentation of malt liquors.

The resemblance between the action of picrotoxin and strychnia led Tschudi to suggest the use of the former in paralysis of the extremities and of the sphincters; and Reil, acting on this suggestion, employed a tincture of the seeds with success in chorea, hemiplegia from cold, and paralysis of the bladder from the same cause.

DULCAMARA, vid. Narcotics.

LOBELIA. — LOBELIA.

DESCRIPTION.—Lobelia inflata, from which this medicine is derived, is an annual or biennial plant, which is common throughout the United States, and grows in neglected fields, along road-sides, and at the edges of woods. It has an erect, angular, and hairy stem, one or two feet high; ovate, serrate, and hairy leaves; and numerous pale-blue flowers in terminal racemes, which are succeeded by ovoid, inflated, and striated capsules, containing in two cells numerous small brown seeds. The whole plant is endowed with active properties, but the leaves and capsules are to be preferred. It has a somewhat irritating odor, and, "when chewed, though at first without much taste, soon produces a burning, acrid impression upon the posterior parts of the tongue and palate, very closely resembling that occasioned by tobacco, and attended in like manner with a flow of saliva and a nauseating effect upon the It yields its properties to water and alcohol; but heat in a great measure destroys them. It contains an active principle which was discovered by Dr. S. Colhoun, but first isolated by Prof. Procter, of Philadelphia, in 1834, and by him called lobelina. Subsequently, in 1843, Reinsch gave the name of lobelina to a compound body which he regarded as containing the active principle of the plant, and in 1850 Mr. Bastick more perfectly isolated it by employing the process recommended by Liebig for procuring hyoscyamia.

Lobelina is a clear, volatile liquid, of a whitish or light yellow color, which emits but slightly the characteristic odor of lobelia, except upon the addition of ammonia. It is soluble in water, but more so in alcohol and ether. Its reaction is alkaline, and it unites with acids to form

salts which are very soluble.

Tinctura Lobeliæ.—Tincture of Lobelia.

Two pints of tincture are obtained by displacement from four troyounces of finely powdered lobelia.

ACTION ON ANIMALS AND ON MAN.—The effects produced by lobelia and its alkaloid are almost identical with those of tobacco and nicotia, but larger doses are required to produce them. Mr. Procter administered a grain of *lobelina* in solution to a cat. In less than two minutes

Mat. Med. der rein. Pflanzenstoffe, p 229.

produced sensible effects on the stomach, and a very little moderate puking, and a kind of prickly sensation throughout the whole system, even to the extremities of the fingers and toes. Since that time I have enjoyed as good health as perhaps before the first attack." It is in this disease that the virtues of lobelia appear to have been chiefly tested by physicians, although, as is well known, they have been made the subject of extravagant eulogy by a notorious charlatan and his sectaries, held up as a panacea, and employed with blind rashness in almost all complaints.

Dr. Bigelow, in the account which he gives of lobelia, quotes Dr. Randall as stating that it is as successful in asthma as any article that he had tried, that it removed the paroxysm in a short time, and restored the patient to quietude and ease. Although the prejudice against the medicine inspired by the mischief it was inflicting in the hands of rude and ignorant practitioners has limited the sphere of its usefulness, there can be no doubt that it deserves more confidence than it has yet received. In support of this opinion the statements of European practitioners may be interesting to the reader. One of the first to employ lobelia in England was Dr. Elliotson, who states that it is by far the best medicine in spasmodic breathing he was acquainted with, and that even if the cause of the attack be not removable, still it will do good. Even in asthma produced by, or at least complicated with, aneurism which ultimately bursts into the trachea, he found the greatest advantage from this medicine. "With many," says Dr. E., "it acts as a charm, and in ten or twenty minutes they will be perfectly relieved, so that all the other remedies used in asthma are as nothing when compared with it." But this author very properly distinguishes the cases in which it is appropriate, and would restrict its use almost entirely to those in which the nervous element is the predominant one. A very similar opinion is set forth by Mr. Bower,3 who professes to have had much experience in its use. In all cases, he remarks, where dyspnœa is a leading and urgent symptom, lobelia is applicable. I say in all cases, because I have never observed any unpleasant effects from its administration, though many are the cases, of opposite characters, which give rise to this distressing symptom. Neumann⁴ announces lobelia as one of the most valuable medicines in diseases of the lungs. According to him, it relaxes the spasm of the respiratory muscles with incredible rapidity, and even in cases depending upon organic causes—disease of the heart, for example it often affords speedy relief. In organic diseases of the lung itself, when a tormenting dry cough and an insufferable tickling in the throat rob the patient of rest, it is in the highest degree beneficial. Nothing approaches the direct and specific action of lobelia upon the motor nerves of respiration. It is speedier and more certain in its operation than digitalis, and more direct than ipecacuanha. The language of Schlesier's is even more laudatory. He thinks lobelia cannot be sufficiently commended in spasmodic asthma; when the patient is

Med. Botany.

³ Ibid., Nov. 23, 1838.

⁶ Dierbach, ii. 235.

Lancet, Oct. 27, 1832, and Jan. 26, 1833. Heilmittellehre; and Dierbach, ii. 234.

ease an agent is required merely to relax the laryngeal spasm, and this indication is completely fulfilled by lobelia; but in the plastic and inflammatory affection, a sedative is needed to abate the inflammatory action, but also, and above all, an emetic capable, by provoking violent efforts at vomiting, of expelling the fibrin which obstructs the larynx. In spasmodic or stridulous laryngitis, therefore, lobelia perfectly fulfils the conditions of cure.

ADMINISTRATION.—Lobelia may be given in substance, infusion, or tincture. Of the powdered leaves, the dose as an emetic is from ten to twenty grains, and as an expectorant, from one to five grains. But a more eligible form is an infusion, which may be made according to the following formula: R.—Lobelia gr. lx to gr. xc; add enough boiling water to make when strained f3iij to iv; syrup f3j. Dose.—A tablespoonful every two hours, in catarrhal affections of adults.

The preparations most frequently employed are the tinctures: Tinctura Lobeliæ (U.S.) and the Tinctura Lobeliæ Ætherea (Br.), of which the dose, as an expectorant, is $m \times to f3j$. In asthmatic attacks one or

two fluidrachms may be administered every hour.

TABACUM. — TOBACCO.

DESCRIPTION.—Tobacco consists of the commercial dried leaves of Nicotiana tabacum, an annual plant of the Nat. Ord. Solanaceæ, which is indigenous to America, but is cultivated in all parts of the world. It has a round viscid stem five or six feet in height, which, like all other portions of the plant, is covered with a short down. The leaves are very large and long, and of a pale green color; the flowers are monopetalous, of a pale greenish color, expanding above into rose-colored segments. The calyx, like the leaves, is somewhat clammy and pubescent.

Tobacco, when simply dried, is destitute of the peculiar narcotic and pungent odor which belongs to the prepared leaves. This quality is developed by moistening the leaves with salt water, and heaping them together until fermentation has taken place. During this process the nitrogenous element of the plant is decomposed and forms ammonia, which appropriates a portion of the acid in the tobacco, and liberates a certain proportion of nicotia, and this, along with the ammonia, develops the characteristic odor of prepared tobacco. As a consequence, it contains much less nicotia than the leaves in their natural state. Indeed, according to Boutron and Henry, the proportion of this alkaloid in the latter is two or three times greater.

Nicotia was first obtained in an impure condition, by Vauquelin, Robiquet, and Warden, in 1809, but the pure alkaloid was procured by Reimann and Posselt, in 1827, by distilling the leaves with potassa or soda. The proportion of it varies very much in different kinds of tobacco. The Kentucky and Virginia and several European varieties contain from six to nearly eight per cent. in the thoroughly dried leaf;

¹ Guibourt, Drogues Simples, 4ème éd., ii. 455.

chiefs. The Pilgrim Fathers of New England and their descendants distinguished themselves by enactments against the use of the weed. In the early days of the colonies, all minors were prohibited from using it, unless sustained by a physician's prescription; and to consume it in public subjected the offender to a fine. In Portsmouth, N. H., it was "ordered that a cage be built, or some other means devised, to punish such as take tobacco on the Lord's day in time of public service." Even the royal pedant, King James, thought it matter of moment enough to employ his pen, and produced a violent distribe against the offensive object, which proved his majesty a passed master in scurrility. Pope Urban VIII. excommunicated all smokers and snuffers, but Benedict XIII., who was an inveterate smoker himself, removed the interdict. Less exalted personages have emulated these examples in our own times, and with like results; in the present, as in the earlier age, fanaticism, by its excesses, kindles an excess of opposition, and aggravates the very evils it professes a desire to cure. Among other absurd stories which circulated in the earlier days of its history, tobacco smoking was accused of producing a sort of sooty deposit within the skullcap or in the brain itself!

Tobacco is now cultivated in almost every part of the world, and after having been rigidly interdicted by several governments of Europe, has become one of the most fertile sources of revenue. In France, for example, where the preparation and sale of tobacco is a government monopoly, the annual revenue was equal, in 1844, to twenty millions of dollars, of which sum three-fourths were clear profit, being nearly equal to the receipts from the tax on drinks, and exceeding that of the impost on sugar. From 1811 down to the period mentioned, the receipts at the treasury from this source alone amounted to more than three hundred millions of dollars, or a contribution voluntarily made to the state, increasing constantly, and averaging more than nine millions per annum. The consumption of tobacco in France, at the latest date mentioned, is estimated at one pound for every inhabitant, of which one-third represents the proportion of snuff used, and two-thirds that of smoking tocacco. Except sailors, scarcely any one chews the weed. In France it is still true, as Mérat wrote in 1821, that "the habit of chewing tobacco is confined to a small number of vulgar people who are, for the most part, addicted to intemperance."4 These facts are of interest when it is attempted to estimate the mischief which the use of tobacco is alleged to produce, and they throw into stronger relief the evils which its abuse entails.

In recent times a renewed interest has been given to the inquiry concerning the operation of tobacco on the human system, by the trial of the Count and Countess of Bocarmé, in Belgium, for the murder of the brother of the latter, by means of nicotia. This tragical

⁴ Dict. de Méd. en 60 vol., art. Tabac.

An Essay on the Influence of Tobacco on Life and Health. By R. D. Mussey, M. D., Boston, 1836.

² Mangerus, Bib. Pharm. Med., ii. 940.

³ Mélier, Rapport à l'Académie de Médecine. Bull. de l'Acad., x. 572, 1845.

respiration, muscular paralysis, dilatation of the pupils, injection of the gills and also of the brain. Frogs resist its action longer, but gradually their breathing grows slow, and the heart loses its excitability; the fore feet are spasmodically retracted, the hind feet lie wrinkled and folded on the back.' Some tobacco juice thrown into the mouth of a black snake, six feet in length, caused it to writhe spasmodically for a few moments, and then to become rigid, in which state it remained after death.²

The following are results of a carefully conducted series of experiments by M. Mélier: Nicotia was given to dogs or cats, generally by introduction into the subcutaneous cellular tissue, and in doses of from one to eight drops. The breathing was, in most of the cases, affected first, and is noted as difficult and anxious; the pupils were dilated, and the animals staggered in walking; violent efforts at defecation were observed in several cases, and a copious discharge of urine, apparently followed by relief; at a more advanced period there was vomiting and a slavering of frothy or ropy mucus; at variable stages from the commencement, agitation and trembling, and in several instances a lively movement of the ears; when death occurred it was immediately preceded by signs of complete exhaustion, and more remotely by convulsions. The exhaustion or paralysis appeared to affect the posterior extremities chiefly.

Very carefully conducted experiments were subsequently instituted, among others, by Albers, Kölliker, Bernard, and Van Praag. They

agree in their main results, which may be thus epitomized:—

It is not true, as has sometimes been alleged, that nicotia acts as an irritant, and still less that it acts as a caustic, when applied to the skin, or even to the mucous membrane. It uniformly renders the respiration slower, after having, in some instances, increased its frequency. But the larger the dose administered the more speedily does the former effect ensue. The breathing has generally a very characteristic peculiarity, which consists in a hissing sound, and which is probably owing to a spasmodic contraction of the larynx and air-tubes.

The pulse, like the respiration, becomes slower after having been accelerated.

The muscular apparatus of various parts of the body is affected with alternate tonic and clonic spasms, and the eyeball generally protrudes, and is spasmodically drawn upwards and outwards. General relaxation succeeds these phenomena, with a tremulous movement of particular muscles, or of the whole body. In some cases which are more rapidly fatal, no spasmodic movements are observed, but immediate and complete prostration, with the tremulousness before mentioned. When the poison acts most promptly, the animal sometimes perishes without any convulsive or muscular agitation whatever.

In general, its application does not elicit signs of pain, and its effect in some instances is to destroy sensibility. The pupils are

¹ HAUGHTON, Dublin Hosp. Gaz., Dec. 1856.

² Bost. Med. and Surg. Jour., Oct. 1856, p. 216.

uniformly dilated under its primary action, but afterwards may become contracted. Sometimes, but not generally, there is abundant salivation. In experiments which did not destroy life, and in those only, was there vomiting or purging, yet recovery is possible without these symptoms.

These results, which supply the deficiencies in the experiments performed by Mélier, without contradicting them, may be briefly stated as follows: Nicotia primarily lowers the circulation, quickens the respiration, and excites the muscular system, but its ultimate effect is the general exhaustion both of animal and organic life.

The dose of nicotia required to destroy life is extremely small. A

single drop has killed a rabbit in three minutes and a half.

On Man.—The following phenomena, representing the physiological action of nicotia were observed by Schroff in the experiments performed by his associates Dworzak and Heinrich. They correspond with those described by Reil in his own case. The dose of the alkaloid varied from x^1 g to x^1 g gr. diluted with a drachm of water. The minutest doses occasioned a burning sensation in the tongue, a hot, acrid irritation in the fauces, and, when larger quantities were taken, the entire length of the œsophagus felt as if it had been scraped with an iron instrument. Salivation was abundant. very small doses were used, a sense of heat diffused itself from the stomach to the chest and head, and as far as the finger ends, accompanied by general excitement; even the smallest ones occasioned headache and a sensation, as of an aura, in the upper jaw; and the larger implicated the brain still more evidently, causing heaviness, giddiness, torpor, and sleepiness, indistinct vision, which was nevertheless attended with unusual sensibility of the eye to light, imperfect hearing, and a feeling as if the ears were stuffed with cotton, frequent and laborious respiration, oppression, and dryness of the throat. In forty minutes after the larger doses, a sense of unwonted debility and weariness was perceived, the head could scarcely be held erect, the face was pale, the features relaxed, the extremities became as cold as ice, and the coldness gradually advanced towards the trunk, and turns of faintness ensued with commencing insensibility and loss of consciousness. A disagreeable sensation in the stomach diffused itself upwards and downwards, accompanied by eructations, nausea, and even vomiting, which last generally procured some relief; a similar feeling extended through the bowels, the abdomen was distended, an urgent desire to go to stool was felt, and a discharge of wind and of some urine procured general relief. This was, however, of short duration. One of the experimenters was attacked, in the first half of the second hour, with peculiar clonic spasms of the whole body which increased in violence during forty minutes, and lasted for an hour. The spasms began by a tremulous movement of the limbs, and gradually involved the whole muscular system, including, and chiefly affecting, the muscles of respiration. This act was oppressed and gasping, every respiratory movement being composed of a number of snort and

LEONIDES VAN PRAAG, Virchow's Archiv., viii. 56. VOL. II — 13

incomplete inspirations. The other experimenter, at this period of the operation, was affected with unusual muscular debility, very laborious respiration, and a rigor. In other respects his symptoms were the same. Both persons, on their return home, felt extremely weak, walked with ill-assured steps, and were very chilly; one of them had a return of the spasms and a frequent desire to pass urine, which was also very copious. The following night both were restless and almost sleepless, and the next day were still unwell, unable to apply the mind, tired, sleepy, and without appetite. The pulse continued weak and irregular, and three days elapsed before the effects were entirely dissipated.¹

It might be expected that the workmen engaged in the manufacture of tobacco would exhibit on a large scale the action of this substance upon the economy. Happily there exist authentic documents illustrative of the subject, and which may be regarded as conclusively proving that many of the statements which have been made respecting it are either exaggerated or groundless. Ramazzini' describes the rude method of preparing snuff, which in his time was used in Tuscany, as occasioning violent headaches, nausea, and continual sneezing, among the workmen who were not used to the occupation; and Patissier, in his abridgment of the Italian author's treatise, says,3 "The workmen in tobacco are generally thin, asthmatic, and of a pallid or yellowish complexion, yet some there are who experience no evil consequences from their trade." Parent Duchatelet and Arcet published a very interesting memoir upon this subject, which has been considered as presenting it under too favorable a light, but without sufficient reason. The following statements contain the conclusions of these They allege that in the greater number of manufactories there is no instance of a workman being unable to habituate himself to the emanations of tobacco. The breaking up of the bales is injurious to some of the men during the first two or three months of their employment. It is denied that the effects upon the functions of digestion and nutrition, described by Ramazzini and others, are in reality produced, unless in altogether exceptional cases, and that nervous affections are equally uncommon among the workmen. Manufacturing tobacco, it is maintained, in conclusion, neither injures the health nor shortens life. Dr. Ruef, physician to the government tobacco factory at Strasburg, affirms that the health of those even, among the workmen, who were used to live in the open air does not suffer any injury. Only one process, that of fermentation, affects the less experienced among them, with headache, dizziness, tremulousness, vomiting, sweating, urgent thirst, and loss of appetite; but these symptoms, it is alleged, are transient and occasion no ulterior mischief. Diseases among the workmen are rare, and the average duration of their lives is fully equal to what is observed among other persons belonging to the same class of society. As an evidence that the emanations from

¹ Mat. Med. der rein. chem. Pflanzenstoffe, p. 234.

² Essai sur les Maladies des Artisans, Trad. de Fourcroy.

Maladies des Artisans, 1822, p. 202. Annales d'Hygiène, &c., Avril, 1829.

tobacco are not injurious even to the feetus, Dr. R. relates the case of a woman belonging to the factory who went to lie-in at the Clinic of Strasburg. During her labor the waters, which were evacuated slowly, were observed to exhale a peculiar, strong, and penetrating odor, like that of fermenting tobacco. The patient, on being questioned, stated the nature of her employment, and thus furnished a probable explanation of the circumstance. The child was alive and vigorous. According to Dr. Ruef, chronic pulmonary affections are infrequent among tobacco workers, and he even affirms that some among them who enter the factory with emaciation, hæmoptysis, and cough, have

there got rid of their pulmonic symptoms.1

A very interesting report on the sanitary relations of tobacco manufactories was made to the French Academy of Medicine by MM. Mélier and Loiseleur de Longchamps,² of which the prominent points are here presented in a summary form. The first impression upon those who become operatives in these establishments is always disagreeable, but especially so for the women; but this effect is temporary. After the acclimation, however, the health of many is, to a certain degree, impaired, and, in the course of two or three years, not a few acquire a dull, grayish tinge of the complexion, somewhat like that of anemia, and remediable by the same means. It is in the fermenting rooms, where tobacco is prepared for making snuff, that its action on the health is chiefly, if not exclusively, shown. Nor is this surprising when it is considered that the workmen are obliged to separate masses of fermenting tobacco at a temperature of 144° F. Fatigue and heat are evidently here very prominent as morbific causes. The workmen believe that their occupation protects them from rheumatism and intermittent fevers, but Dr. Ruef, in a subsequent paper to that quoted above, discredits this notion. spects the salutary influence of tobacco manufacture on consumption, five of the ten physicians attached to the national manufactures of France express an affirmative and two a negative opinion. deaux, according to M. Ruef in his later essay, consumption is unusual amongst the operatives, and the disease advances less rapidly in them than in patients placed under different circumstances. In nearly all the other establishments it is far less frequent than among the surrounding population, and, indeed, is in some quite unknown. tobacco manufactures of Sardinia have been the subject of an interesting report by Dr. Berutti, professor of physiology in the University The author comes to the conclusion that there is no disease among the workmen which can be fairly attributed to the peculiar influence of tobacco. He regards the cachexia described by the Parisian observers as independent of this cause, and concludes that inflammatory affections are really less frequent in tobacco factories than in others placed under like hygienic conditions.3 M. Chevallier, in a statement relative to the tobacco workers in Belgium, presents the following summary of his researches: 1. It very rarely happens that

¹ Dierbach, op. cit. from Arch. Méd. de Strasburg, 1835.

<sup>Bull. de l'Acad. de Méd., x. 569, Avril, 1845.
Bibliothèque du Médecin Practicien, xiv. 479.</sup>

the new hands in the factories do not become accustomed to their work in a few days. 2. The exceptions to this rule are quite inconsiderable. 3. Other things being equal, tobacco workers enjoy the average duration of life. 4. There is no example of a workman in the factories of Antwerp having perished from the exhalations of tobacco.

The habitual use of tobacco by chewing, smoking, and snuffing is productive of peculiar effects, and, when carried to excess, of certain definite morbid states. Chewing tobacco in moderation has not been shown to be mischievous, however repugnant it may be to persons of refinement and delicacy. It is confidently believed by many to promote digestion; and they find that a small piece taken after meals protects them from the unpleasant sensations in the stomach which, without this aid, they are apt to suffer. Very possibly the saliva which is secreted more abundantly under this stimulus may account for the alleged salutary effect. But if so large a portion of the weed is taken as to induce frequent and excessive spitting, the very reverse effect must ensue; the stomach is robbed of its natural excitant and a chief agent in digestion, the whole body is enfeebled by the waste of its fluids, and the nervous system sinks into debility under the constantly renewed alternation of stimulus and depression. And if the saliva is swallowed instead of being rejected, whatever is gained in cleanliness is lost in health, for the stomach and the entire system cannot long resist the impression of such doses of a virulent poison. In general, the excessive use of tobacco becomes mischievous both by the waste it causes of a precious animal fluid and by its direct influence upon the nervous and digestive apparatus. In both respects, chewing tobacco is infinitely the most hurtful mode of using it. The records of medicine, and especially those of America, abound in illustrations of the subject, for in no other country is the habit in question at all prevalent, except among sailors and others employed in the coarsest toil.

It would extend this notice unduly were the observations of all the respectable authorities to be cited at length who have contributed to show the deleterious effects of the abuse of tobacco. Allusion will be made only to some of the most modern and complete.

In the publication referred to above, Dr. Mussey presents a summary of the symptoms which he had himself observed, and illustrates it by the detail of several cases. A still more recent and complete description is contained in the narrative of nine cases published by Dr. Shipman.² The morbid symptoms were manifested chiefly by the nervous and digestive organs. The operations of the mind were neither so vigorous nor so clear as in the natural state; low spirits, irresolution, hypochondria, and gloomy anticipations beset the patients at all times, but were least tolerable during the process of digestion; nightmare, with an unusual exaggeration of its horrors, deprived them of repose at night, and by day, a fear of sudden death assailed them. The first

Bulletin de l'Académie de Méd., x. 787.

Boston Med. and Surg. Jour., 1844.

and here and there a streak of mucus. This author thinks, also, that the posterior nares are probably in the same condition, and that the irritation is transmitted to the eye; undoubtedly this organ is frequently injected and watery in smokers, and often presents a spasmodic twitching of the orbicularis muscle. Mr. Lizars enumerates ulceration of the lips, tongue, gums, mucous membrane of the mouth, tonsils, velum, and pharynx, among the effects of this habit, and states that he attended a captain of the Indian navy, who fell a victim (from smoking cheroots) to ulceration of the mucous membrane of the left cheek, which extended backwards to the tonsils, velum, and pharynx, and which exhibited all the characters of carcinoma: '-which it probably was. Dyspepsia is occasionally met with as a consequence of excessive smoking, yet rarely in the aggravated form so common among chewers of the weed. Loss of appetite, constipation, hæmorrhoids, acne, and gumboils are ascribed to the same cause; it is more apt even than "chewing" to render the voice coarse, deep-toned, or smothered, and to prevent clear articulation by causing an excessive secretion of mucus in the fauces. Smoking tobacco also weakens the nervous system, inducing palpitation of the heart, tremulousness of the limbs, neuralgia, and morbid susceptibility, with diminished tone and power. These symptoms occasionally assume the aggravated form of angina pectoris, as M. Beau has pointed out, and as we have witnessed in several cases. When too much indulged in, or when the nervous system is rendered impressionable by ill health, by losses of blood, or of any other fluid, or by over-excitement, smoking aggravates the already existing symptoms, and may induce that state of hypochondriasis which has already been described. Lizars, and others, allege that it destroys the virile powers and sexual desire.

About 1860 a violent outburst of denunciation took place in England against tobacco-smoking, which finally assumed the form of a petition to Parliament. The blasts and counterblasts of public opinion appear to have thoroughly winnowed the subject; and its ultimate form may be represented by the conclusions of Dr. Richardson, of which the following is a summary: 1. The effects produced are very transitory. 2. The evils of smoking are functional in their character, and statements that it causes "insanity, epilepsy, St. Vitus' dance, apoplexy, organic disease of the heart, cancer, and consumption," are devoid of truth. 3. The habit of smoking is deleterious to the young. 4. Tobacco is a luxury, but is probably one of the least hurtful of luxuries.3 There are several diseases, however, not enumerated by Dr. Richardson, which excessive smoking unquestionably develops. One of these is amaurosis, many cases of which have been traced to tobacco-smoking by no less competent authorities than Mackenzie and Sichel. The former many years ago "hinted his suspicion" that it is "a frequent cause of amaurosis, and the latter is now of opinion "that there are few persons who have smoked during a long period more

¹ Times and Gaz., Aug. 1854, p. 146.

² Edinb. Med. Jour., Aug. 1862, p. 178.

³ Lancet, July, 1836, p. 73.

⁴ Dis. of the Eye, 1835.

than five drachms of tobacco per diem, without having their vision and frequently their memory enfeebled. A case of impaired vision from the same cause with general anæsthesia, and occasioned by immoderate smoking, is related by Dr. Farnsworth. In spite of a well directed treatment the disease grew worse, until the discovery was made that the patient was in the habit of smoking a pipe almost continually with the coarsest kind of tobacco. On relinquishing this practice he gradually recovered. A striking example is reported of this affection, under the care of Mr. Wordsworth, in whose opinion it is incurable. Mr. Wordsworth has also published three cases illustrating the production of amaurosis by tobacco, and he states that he has seen a considerable number of others. It is worthy of remark that, in most of these instances a pipe was smoked with the strongest kind of tobacco.

The common practice of smoking immediately before going to bed is certainly soothing to those who have toiled all day, and it perhaps affords them the only hours of really calm enjoyment in life. But to one excited by annoyances, weakened by ill health, or rendered susceptible by a too close application to study, the evening cigar is a certain foe to sleep, the restorative which he stands most in need of; he remains helplessly awake, or, after passing a restless and dreamy night, he rises enfeebled and unrefreshed. It is often objected to the practice of smoking that it begets a fondness for strong drinks. Water seems mawkish to the palate of the smoker, and he moreover feels instinctively that whatever is unpleasant in the effects of tobacco is neutralized by alcoholic beverages, while the stimulation of these liquids is moderated by the sedative action of the weed. The two articles mutually counteract each other. It does not appear, moreover, that either of them, used to excess, leads to a corresponding intemperance in the use of the other.6

Snuffing is a form of using tobacco which, however it may offend delicacy, is not chargeable with the same mischiefs as those which have been considered. It blunts the senses of smell and taste, and alters the voice, and, further, by passing into the stomach the particles of snuff may give rise to dyspepsia, yet seldom in a very aggravated form. Dr. Prout, however, goes so far as to assert that he has seen this affection terminate in malignant disease. There can be no doubt

⁴ Lancet, July, 1863, p. 95.

Willis, in his Practice of Physic, alludes to this double operation of tobacco. He says: "It doth not only procure sleep alone, but sometimes also the contrary of it,

which is watchfulness."—On the Operation of Medicines, 1684, p. 140.

¹ Br. and For. Med.-Chir. Rev., July, 1863, p. 265.

<sup>Am. Med. Times, Oct. 1862, p. 189.
Times and Gaz., April, 1863, p. 345.</sup>

In the Bibliotheca Pharm. Med. of Mangetus, the following rational conclusion is stated. After rehearing some of the alleged mischiefs of smoking, the author concludes: "Non inde tamen sequitur fumum nocivum esse, cum multos novimus qui hodie et copiose per plures annos eo usi sunt, sanos tamen et validos vitam ad extremam senectutem produxisse, nec ullum inde incommodum sed potius maxime juvamen precepisse: aliis enim ventriculum refocillat, et concoctionem promovet, aliis alvum leniter solvit; alii nullum inde commodum at neque damnum sentiunt quibus usus ejus adiaphorus est."

that nicotia has been extracted from all the organs of a person addicted to the immoderate use of snuff. Snuff is sometimes adulterated with acetate of lead for the purpose of giving it more piquancy. Four examples are reported by M. Meyer, of Berlin, in three of which the specific form of colic, and in all paralysis of the extensor muscles, were present.² A case of colic and general lead poisoning from this cause is also related by E. Mayer, of Halle.3 Alfter reports a case of chronic lead poisoning from snuff which was found on analysis to contain two and one-half per cent. of the metal. Snuffing is a habit more inveterate, perhaps, than either of the remaining modes of using to-A singular illustration of its empire is furnished by Merat. "I was walking," he relates, "in the forest of Fontainebleau, when I found a man stretched upon the ground. I supposed that he was dead, but on approaching him he asked me in a plaintive tone if I had any snuff, and on my replying in the negative he fell into his original state. It did not cease until I brought a wood-cutter to the spot, who gave him several pinches of snuff in succession. He then related that he had set out in the morning supposing his snuff-box to be in his pocket, and that after he missed it he had walked on as long as possible, but at last his longing for it became so intense that he was unable to move a step further."

In estimating the influence of tobacco upon the health, the power of habit is not to be neglected. It is this, doubtless, which explains in part the striking difference between the effects it produces upon the novice and upon the expert in its use. But it should also be borne in mind that the former, out of awkwardness, is apt to allow the juice of the tobacco to enter his stomach, or the smoke to penetrate his lungs, while the adept seldom does either, but expectorates the one, and by an automatic action of the muscles of the fauces excludes the other from the trachea. To really inspire the smoke of a pipe or cigar may be learned and practised with impunity, but there are few even among veteran smokers who can accomplish the feat without serious inconvenience.

The poisonous action of tobacco might be illustrated by a great number of cases, but the following summary of its symptoms will render the subject clearer. An overdose gives rise to malaise, nausea, vomiting, a burning heat in the throat and stomach, colic, diarrhæa, urination; extreme giddiness, great anxiety, with a disposition to faintness, pallor, coldness of the extremities, spasmodic trembling; the pulse is small, weak, tremulous, and intermittent; the breathing labored and stertorous; there is a paralytic relaxation of the voluntary muscles, and clonic spasms of the limbs. The pupils are but slightly affected, and the eyes seem to be sensible to light. This state is succeeded by a general torpor, or utter prostration, which is not coma, but which may terminate in death. It was, perhaps, the fact that these symptoms are so directly the opposite of those produced by nux vomica which led to the suggestion of tobacco as a remedy for poisoning by

^{&#}x27; Bull. de Thér., lxii. 88.

Jour. f. Pharmakodyn., ii. 221.

Dict. de Méd., tom. liv.

³ Virchow's Archiv., xi. 209.

⁴ HENLE's Zeitschrift, 1859, p. 158.

minutes, the life of a charming little boy by an immoderate injection of the infusion of tobacco."

Nicotia is one of the most potent of poisons. Its physiological action, as has been shown already, presents no essential points of difference from that of tobacco itself, or of its essential oil; but when administered in sufficient quantity to destroy life, its fatal effects are produced in less time than those of any other poison, except prussic acid. In the famous case of Count Bocarmé, his victim appears not to have survived more than five minutes the administration of the poison; and Orfila affirms that perfectly anhydrous nicotia in sufficient quantity may destroy the life of man in two or three minutes. Mr. Taylor, in commenting on a case of suicide by this substance, concludes that the person "became insensible and powerless within a few seconds, and that he died in from three to five minutes." In this case death took place quietly and without convulsions.

REMEDIAL EMPLOYMENT.—The distressing symptoms which, even in moderate doses, it occasions, the risk of fatal consequences, and the uncertainty in regard to the degree of its influence upon individuals, have tended to restrict the medicinal employment of tobacco within comparatively narrow limits. Yet, as the virtues of the drug cannot be denied, and as it is not more dangerous to life than several of those which are commonly prescribed, it ought not to be excluded from use on account merely of its repulsiveness. Its virtues are both peculiar

and unequivocal.

External Use.—Preparations of tobacco have for a long time been used for cutaneous eruptions and parasites. In Hungary, a strong decoction of the plant is a popular remedy for the itch among sheep, and for the scab to which these animals are subject. An infusion, decoction, or ointment of tobacco has been successfully employed by numerous physicians as a remedy for the itch. Dodoens, Boerhaave, Coste, Fournier, Beçu, and others, have recommended it strongly, and Dubois, from whom this statement is borrowed, affirms that he has found it very efficacious in the form of a decoction in which sal ammoniac and sea salt had been dissolved, and which he applied three times a day.3 Unless the eruption were very limited, this method is scarcely to be recommended while so many more efficient ones exist. That it is dangerous is attested by numerous cases, of which several have been already cited. Prurigo, pityriasis, and some other cutaneous eruptions, have also been treated by tobacco. Bruised leaves of the fresh plant have been recommended as an application in urticaria, and in several painful disorders. They also speedily relieve the stinging of nettles. In gout this is an old remedy, but physicians of our own time have found it useful. Dr. Vetch, of London, highly recommended it as a palliative of the pain in this disease and in articular rheumatism, and other authorities have given it a like commendation. The fumes of burning tobacco have been employed for the same affection, and commended by Réveillé Parise, and by Hinard, 6

I Toxicologie, 5ème éd., ii. 513.

³ Mat Méd. Indigène, p. 225.

⁵ Bull. de Thérap., ii. 79.

² Guy's Hosp. Rep., 3d ser., iv. 352.

⁴ Sigmond, op. cit.

⁶ lbid., xxiv. 287.

a dislocated jaw in its new position has been overcome by causing the patient to inspire tobacco fumes until nausea was produced. Tobacco has been included in the long list of cures for epilepsy. regards it as a precious remedy in epilepsy, catalepsy, hysteria, and idiopathic tetanus: but his opinion is derived from theoretical considerations, and is not supported by experience. It is possible, however, that when epilepsy is produced by onanism it may sometimes be cured by tobacco, for, as previously stated, and as Dr. Fischer, of

Dresden, has remarked, the use of tobacco allays sexual lust.1

Tetanus. Tobacco should rank next to opium in the treatment of this affection, for its success is hardly less equivocal, although its mode of action renders it perhaps less eligible. Tobacco appears to have been used in the last century, and indeed in the early part of the seventeenth century, for idiopathic tetanus, but the first authentic mention, it is believed, of its successful employment in the traumatic affection was made by Mr. Duncan in 1815,2 who, while in Grenada, cured this disease in a negro whose foot had been lacerated by an iron cylinder. He employed tobacco smoke. In 1822, Dr. Anderson, of Trinidad, cured five cases of traumatic tetanus by the use of tobacco in fomentations, cataplasms, and injections.3 In 1825, Dr. B. Smart, of Maine, reported a very interesting case of tetanic spasm produced by an accumulation of clay in the intestines, and which was at first relieved and ultimately cured by tobacco enemata. Dr. O'Beirne' cured a case of this affection, after six weeks' treatment, chiefly by the use of tobacco; in 1826 a case was published by Dr. Briggs, which was reported to him as somewhat rudely, but successfully, treated by the same agent; and in the same year Dr. Jackson (of Northumberland, Pa.) published an equally fortunate result in a case of traumatic tetanus, obtained by the application of tobacco to the wound and to the epigastrium of the patient. Mr. Bullock reports the cure, by means of tobacco enemata, of a very severe case of the disease, occasioned by a blow upon the side, which made no external wound. recently an instance of traumatic tetanus cured by tobacco enemata has been reported by Mr. Pridie, and another under the care of Mr. Simon, in which nicotia was used. The dose of this remedy employed was at first one-twelfth of a minim, which was gradually increased to one-sixth of a minim.' The share of the medicine in the cure was not very evident. Several of the above cases are included in the nineteen which the table published by Mr. Curling contains." Of the sensations caused by tobacco this author remarks that they are so peculiarly distressing that, after its full effects have been produced, patients will hardly submit to a repetition of them. Of the nineteen cases collected by Mr. Curling, nine recovered, and the remainder were for the most part feebly impressed by the remedy, or were brought under its

DIERBACH, loc. cit.

Trans. Med. Soc. Edinb., i. 184; ii. 365.

Dublin Hospital Reports, iii. 343.

⁷ Med. Recorder, x. 315.

² Edinb. Med. and Surg. Jour., xi. 198.

⁴ Am. Jour. of Med. Sci., vi. 337.

⁶ Ibid., xxv. 303. Lond. Med. Gazette, July, 1841.

⁹ Month. Jour. of Med. Sci., March, 1846, p. 650. ¹⁰ Times and Gaz., July, 1858, p. 112. 11 A Treatise on Tetanus. London, 1836.

influence at too late a period of the disease. He recommends that the dose at first should be just sufficient to act upon the system, and that afterwards it should be increased in order to maintain the impression; and he assures us that he did not succeed in finding a single case in which, when fully and fairly tried before the powers of the constitution had given way, it had been known to fail. Without maintaining that the remedy will always avail, Dr. C. holds it, with good reason, to be the best that we at present possess. He is of opinion that not more than a scruple of tobacco leaf, infused in eight ounces of water, will be enough for an injection, which must afterwards be increased in strength in proportion to its effects. In the very year when Mr. Curling's essay was published, a memoir "On the Employment of Tobacco in the Treatment of Tetanus" was transmitted to the Royal Academy of Medicine by M. Cavenne, of Martinque. The writer appears to have been quite ignorant of what had already been written upon the subject, and to have thought of tobacco as a substitute for opium at a time when none of the latter was at hand. portion of his cases were of idiopathic and a portion of traumatic origin, and the form he adopted of administering the medicine was by injection. It would appear that all of the cases terminated favorably. Nicotia has been employed in tetanus in several cases besides that already cited, some of which are reported by Prof. Haughton,* and one of singular severity by Mr. Tufnell, of Dublin.3 The medicine was administered in doses of one drop every two hours. Its taste, was found extremely repulsive, and it occasioned, along with relaxation of the spasms, profuse vomiting and perspiration. When it could no longer be administered by the mouth in consequence of rigidity of the jaws, it was given by enema in doses of two drops at the same intervals as before. Fifty-six drops in all were taken. In deciding whether to employ opium or tobacco in a case of tetanus, the safest guide would appear to be the constitution of the patient. If he is of a robust and healthy constitution, the speedier and safer course of cure would be by tobacco; but in opposite conditions the use of this remedy would involve some risk. It is probable, also, that tobacco is more especially indicated at the commencement of the attack, before the powers of life have begun to fail; in an advanced stage the propriety of using it is very questionable.

Poisoning by Strychnia. In 1856, the Rev. Prof. Haughton published an account of some experiments illustrating the antagonism of nicotia and strychnia, and in 1857 Dr. O'Reilly, of St. Louis, cured a person who had taken six grains of strychnia, by means of a strong infusion of tobacco. A boy who had swallowed about four grains of strychnia was successfully treated by the same method in the hands of Dr. Smyly. These cases, taken in connection with the illustrations already given of the curative power of tobacco and its alkaloid in tetanus, prove their inestimable value in two affections of the most formidable character and the least amenable to medical treatment.

¹ Bull. de l'Acad., i. 193.
² Dublin Quar., Aug. 1862, p. 172.
³ Am. Jour. of Med. Sci., Apr. 1863, p. 496.

[•] RANKING'S Abs. (Am. ed.) xxix. 287. • Dublin Quart. Jour., Aug. 1862, p. 183.

Diseases of the Digestive System—Constipation, Hernia, &c. Authors have described the virtues of tobacco in "constipation," in "ileus," and in "hernia," but, if we except external strangulated hernia, without clearly distinguishing the anatomical conditions to which they applied these names. It is not easy, and perhaps is not possible, to determine what was the actual condition of the intestines in any of the cases which terminated favorably, since the symptoms presented in all of them do no more than indicate an obstacle to the passage of their contents through the bowels, and in some cases inflammation of the peritoneum besides. Yet in all of the forms of obstruction elements exist for the removal of which tobacco forms an appropriate agent; for should the obstacle consist of that somewhat hypothetical condition called spasm of the bowels, nothing could promote its thorough relaxation better than tobacco; is an accumulation of fæces the impediment to a normal action of the intestinal canal, the same remedy must operate favorably by promoting relaxation of the bowel, and at the same time by dissolving its contents with the augmented secretion; should a true hernia exist within the abdomen, or appear externally, tobacco must contribute to making the protruded bowel resume a natural condition, not by relaxing the spasm which has been imagined to account for its stricture and incarceration, but by exhausting the protruded portion of its fluids, diminishing its bulk, therefore, and consequently facilitating its return; or, finally, when the bowel is contracted by being twisted upon itself, by intussusception, by an interstitial deposit, by the pressure of a tumor, by fibrinous deposits and adhesions between adjacent surfaces of the peritoneum, or when it is occluded by a foreign body, the several modes of action enumerated may concur in overcoming the obstacle to the passage of the intestinal contents. The only remaining condition which produces symptoms of intestinal obstruction is simple and passive dilatation, tending to softening or to gangrene of the bowel, a state which has been well described by Abercrombie, but has no distinctive symptoms. In it, doubtless, the operation of tobacco would either be negative, or, more probably, mischievous, for the essence of the disease seems to be paralysis of the muscular coat of the intestine.

Sydenham was one of the first authorities to recommend tobacco in obstruction of the bowels, but he seems to have employed it only as a last resort, and after the failure of bleeding, purges, and opiates. He directs tobacco smoke to be forced up the bowel through a pipe from a large bladder, and to be repeated after a few hours. A physician of Paris, who was paralytic during the last seven or eight years of his life, found the only effectual means of procuring an evacuation from his bowels to be a tobacco enema, which he took at intervals of ten or twelve days. An interesting case is related by Turner, of a sailor who, in consequence of a penetrating sword wound of the belly, was unable to have any movement of the bowels, in spite of various emollient and laxative clysters, until the fumes of tobacco were injected

Works (ed. of Syd. Soc.), ii. 269.

² Dict. de Méd. en 60 vol.

³ Medical Observations and Inquiries, ii. 307.

in which tobacco is already burning, a strip of paper is thickly wound around the juncture, and when the stem of the second pipe is inserted into the anus, an attendant, by blowing through the first, drives the smoke into the bowel. Another equally simple expedient was suggested by Gaubius; the nozzle of a pair of bellows is introduced into the rectum, and the smoke drawn into the instrument from a funnel placed over the vessel containing the burning tobacco. But whatever mode is selected for applying this remedy, the proper period for doing so is as nearly as possible after the symptoms of strangulation have appeared, while the patient is still strong, and when the protruded bowel is free from adventitious adhesions. At a more advanced stage he may be unable to bear the amount of sedation requisite for reducing the hernial mass, even should adhesions not already render this impossible.

In cholera morbus and lead colic the smoke and the infusion, as well as fomentations, of tobacco have been recommended by various authors, but their success is not such as to inspire confidence in so violent a remedy. Ascarides have been very successfully treated by tobacco enemata, and even round worms have been expelled after the injection of tobacco smoke, as happened in Mr. Turner's case alluded to above. In poisoning by mushrooms, tobacco is said to be a certain antidote. Their mode of action appears to be, in many instances, to produce congestion of the brain and narcotism; in these, at least, the salutary power of tobacco is explicable. Two cases are recorded by Dr. Emerson in which tobacco appears to have acted as an antidote to arsenic, and some experiments on dogs were made by W. Schultz, which seem to bear the same interpretation; but Dr. Florio, on the other hand, asserts that his trials with rabbits do not furnish any ground for

adopting the conclusions of the previous observers.*

Dropsy. Towards the close of the last century the virtues of tobacco as a diuretic were highly extolled by Fowler, who reported a large number of cures of dropsy and dysury through its use.3 Of dropsy he states that he had treated seventy-nine cases, of which twenty-eight were cured and thirty-two relieved. In his work a great many of the cases are described, but with such scanty details that it is quite impossible to decide how many of them were examples of simple anasarca and serous effusion, and in how many the dropsy was merely symptomatic of some organic affection, and in its nature incurable. Dr. F. employed chiefly the following preparation: R.—Tobacco 3j; boiling water Oj. Macerate for an hour in a covered vessel placed in a sandbath; strain off fourteen ounces, and add to them two ounces of alcohol. Of this infusion about forty drops twice a day was the dose for an adult to begin with, but it was rapidly increased until a slight degree of vertigo or nausea was felt after each dose. The quantity was then diminished, so as to prevent these disagreeable symptoms, especially if the discharge of urine was augmented, which seems to have been generally the case. The immediate effect of the medicine

¹ Szerlecki, loc. cit.

² Dierbach, op. cit., p. 901.

³ Med. Reports of the Effects of Tobacco, &c. 2d ed. London, 1788.

serious symptoms. The wine of tobacco is very seldom used. Its dose is from ten to thirty minims. Fowler's infusion, described above, is probably a better preparation. Tobacco ointment may be applied to eruptions, tumid glands, and to bruised parts, with the precautions already mentioned. The fresh plant may be used for several of the medicinal purposes of tobacco, but, from not having yet undergone fermentation, its properties are far less active than those of the prepared leaves.

VERATRUM ALBUM.—WHITE HELLEBORE.

Description.—Veratrum album is a native of Europe, where it abounds in Switzerland and some adjacent countries. It is a very beautiful plant, and measures from two to four feet in height. It is surrounded near its base with large, broad, plaited, and somewhat hairy leaves, and bears on the summit of its stem large panicles of greenish-white or greenish-yellow flowers. The rhizome is fleshy, cylindrical, and furnished with numerous separate radicles. This is the officinal portion of the plant, and, as found in the shops, is generally denuded of its radicles. It is about the thickness of a man's little finger, blackish and wrinkled without and whitish within, and the radicles, when they exist, are about the size of a crow-quill, and yellowish externally. In its fresh state the root has a strong and nauseous smell, which is nearly lost by drying. The taste, even of the dried root, is at first sweetish, but afterwards is persistently bitter, acrid, and burning. Its virtues depend chiefly upon veratria.

ACTION. On Animals.—The white hellebore plant is said to be very injurious, and often fatal to flocks and herds that browse upon the grass where it grows and to domestic fowls that eat its seeds. The older writers describe vomiting and spasms with gastric inflammation as its chief effects upon animals, and they state that in Spain arrows dipped in its juice were formerly used in hunting. The wounded animals perished from the effects of the poison, but their flesh was not

rendered unfit for eating.1

Gohier made use of a decoction of white hellebore to bathe dogs affected with the mange. They became lethargic, howled piteously, vomited, had a frequent pulse and injected eyes, and appeared to be

epileptic or rabid.

Wibmer has given an abstract of the experiments of Wepfer, Courten, Viborg, Schabel and Emmert, Orfila, Hertwich, and others, with this substance upon various animals both large and small. The effects were nearly the same whether it was introduced by the skin, the stomach, the rectum, the bloodvessels, or any other part, and consisted of straining to vomit or actual vomiting, salivation, general debility, a small, feeble, irregular, or rapid pulse, slow and labored respiration, spasms of the abdominal muscles, general tonic or clonic

¹ MURRAY, Apparat. Med., v. 145. ² MÉRAT et DR LENS, Dict., &c., vi. 858.

diluent or lenitive medicines for the purpose of moderating the harshness of its action.

It gradually fell into disuse, either on account of the accidents occasioned by its imprudent use, or, what is more probable, because new remedies were introduced to supplant it under the dominance of new medical theories. Yet in dropsy, epilepsy, and insanity it was not entirely abandoned, in spite of the harshness of its operation, which was fully recognized; and it was also applied externally for the destruction of vermin in men as well as beasts. A strong decoction of this substance has been found speedily to cure pruritus vulvæ; possibly by its insecticide virtues.

The irritant properties of the medicine led to its use as an errhine when finely powdered and diluted with starch or other inert substance, or with snuff. Under the name of cephalic snuffs such mixtures have been used to relieve the headache which attends the onset of coryza,

by promoting a discharge of the nasal mucus.

Its hostility to the life of the lower animals caused it to be employed in the cure of itch, either in a simple ointment or associated with sulphur, ammoniated mercury, sulphuric acid, or nitre; but equally efficacious and less disagreeable remedies have supplanted these.

SABADILLA.—CEVADILLA.

DESCRIPTION.—Veratrum sabadilla is a native of Mexico. Its Spanish name, which is a diminutive of the word cebada, barley, is said to have been given it from the resemblance it bears to this plant in its The ensuing description, which follows after that of leaves and fruit. Guibourt, Neligan, and others, answers more closely to Asagræa officinalis, Lindley. The root is bulbous, and from it springs an annual stem five or six feet high, garnished with numerous long, linear, grassy leaves, and terminating in a long spike of small white flowers, which are succeeded by seed-pods forming an ear resembling that of barley. The fruit consists of three oblong, delicate capsules, coalescing by the base, and about half an inch in length, in each of which are contained several shining black seeds, about three lines long, hard, inodorous, and of an exceedingly acrid and permanently bitter taste. These are the officinal portion of the plant. Their active properties are derived from the veratria which they contain.

ACTION AND USES.—Murray quotes' several authors to show that this substance is capable of destroying dogs and cats, and of occasion-

ing in them vomiting and convulsions.

Monardes, who was the first person to furnish an account of its virtues (1572), says that it acts like a cautery upon ulcerated or gangrenous flesh. Until the close of the last century it was almost exclusively employed as an external application, and chiefly for the purpose of destroying vermin in bedding and other furniture, and also the lice infesting the persons of soldiers, sailors, paupers, and a certain order of

friars. From the last-named usage it was popularly known in France as the Capuchin's powder. Cases were not wanting in which its application to the sore head produced alarming symptoms, and even death. Its tincture has been found efficient as a remedy for the *itch* by M. Bourbousson. Lhuillier declares that, in the course of a large experience with the remedy during fifteen years, he never once failed to effect a cure by means of frictions made with powdered cevadilla mixed with sweet oil and brandy immediately after the patient had taken a prolonged warm bath.¹

As a vermifuge for tænia, this medicine has been vaunted by Schmucker and Herz, and for ascarides of the rectum by Hufeland. By the former two physicians it was also alleged to be efficacious in amenorrhæa, chlorosis, mania, melancholy, epilepsy, and chorea,² and

Foulhioux claims to have cured hydrophobia by its means.3

The dose of the powdered seeds is stated at thirty grains; it should be followed by barley-water sweetened with honey, and repeated daily, but in smaller doses. Thirty grains infused in two ounces of boiling water may be given at a dose.

Veratria.

DESCRIPTION.—To a distillate and decoction of the seeds of cevadilla in alcohol sulphuric acid is added, which forms a sulphate of veratria in solution. On the addition of magnesia, the veratria is precipitated in an impure state, and is then collected and redissolved in alcohol. By evaporation of the latter, the veratria is partially purified, and still further by boiling in water acidulated with sulphuric acid and containing animal charcoal, and then straining the solution. On the addition of ammonia, the veratria is precipitated and is then washed with cold water and dried. It is a grayish-white amorphous powder which fuses at a moderate heat, becomes red on the addition of sulphuric, and yellow with nitric, acid. It restores the blue color of litmus paper reddened by acetic acid. It is very slightly soluble in water, but is perfectly so in alcohol and less so in ether.

HISTORY.—Veratria was discovered by Meissner in the seeds of veratrum sabadilla in 1818, and in the following year it was also extracted from the same source and from the rhizome of V. album by Pelletier and Caventou. In 1821 it was first employed in physiological experiments by Magendie and Andral, and soon afterwards by the former in the treatment of disease. In 1826 Bardsley used it in rheumatism and dropsy, and more general attention to it as a remedy

for neuralgia was excited by Turnbull's essay in 1834.

Action. On Animals.—The original experiments of Magendie and Andral, which, however, were not made with pure veratria, led them to conclude that this substance is a powerful local irritant; that, however introduced into the economy, it occasions gastro-intestinal irritation; and that, in large doses, it gives rise to tetanus. More complete

Abeille Méd., ii. 220.

Bevue Méd., lxxxiii. 381.

RICHTER Ausfür. Arzneim., ii. 226.

⁴ Orfila, Toxicologie, 5ème éd., ii. 460.

and accurate experiments have since been performed. Among them the most valuable are those of Esche, which were performed on dogs, cats, rabbits, and birds, and of which the following is a summary: A few minutes after the administration of veratria the animals manifested anxiety and restlessness, saliva flowed from the mouth, the action of the heart became irregular, slow, and intermittent, and the respiration deep and labored; there was violent retching or vomiting, a copious discharge of liquid with mucus and even blood from the bowels, with spasmodic retraction of the abdominal walls. The respiration gradually became slower and more difficult; the animal appeared by its restlessness to be in great distress, and its eyes were dull and prominent. The voluntary muscles were evidently feeble and unable to support the body, and spasms affected the pharynx, the muscles of the face, and the lower limbs. The functions of the brain were wholly undisturbed. After smaller doses had occasioned vomiting and purging, and transient convulsive movements, with loss of muscular power, and a slow pulse, the animal gradually recovered, but the last symptom, with general debility and want of appetite, remained for some time longer. Very large doses affected the whole nervous system with loss of power and tone; the respiration and circulation gradually became extinct, the convulsive movements passed into tetanus, and the animal died. On dissection, the only changes found were those which attend death by asphyxia; the lungs, heart, and liver were gorged with blood; the tongue, throat, and gullet were pale; the stomach sometimes contracted, but free from all traces of inflammation; and the bowels were also contracted and somewhat reddened. In the brain nothing abnormal was discovered.

From his experiments Esche drew the following among other less important conclusions: 1. The more directly veratria enters the blood, the more rapidly are its effects developed. 2. It is not in a high degree a local irritant. 3. Moderate doses act by producing vomiting, diarrhœa, increased secretion of bile, a slow pulse, impeded respiration, diminished animal temperature, impaired common sensibility, and an altered condition of the blood. 4. Large doses, in addition, occasion debility, then spasm, and finally tetanus of the voluntary muscles. The functions of the brain are undisturbed. 6. It differs from the various vegetable products from which it is extracted by the constancy, rapidity, and extent of its operation, and in its not producing inflammation of the stomach and bowels. Van Praag's experiments led him to similar conclusions; but he drew attention to the fact that the primary impression of veratria on the nervous system, and through it upon the circulatory and muscular system, is that of a stimulant, while its ultimate effect is to produce spinal paralysis.2 Analogous results were obtained by Faivre and Leblanc.3

The experiments of Kölliker appear to show that veratria exerts through the blood a directly paralyzing action on the muscles, which thereby lose their irritability, and become tetanic. This action was

De Veratriæ Effectibus, 1836; Vinchow's Archiv, vii. 260.

² Virchow's Archiv, vii. 286.
³ Archives Gén., 5ème sér., v. 258.

Taylor refers to a case in which it is said that a lady who had taken 11g gr. of this substance "was found insensible, the surface cold, the pulse failing, and there was every symptom of approaching dissolution." Two children, aged three and a half and one and a half years respectively, drank of a decoction of white hellebore intended to destroy the vermin upon cattle. The principal symptoms were the following: Violent vomiting of acid and yellow fluid, insensibility, a pale and sunken countenance, a small sharp pulse, heat of head and coolness elsewhere, slight spasmodic movements of the face and limbs, neck somewhat swollen, deglutition impossible, pupils dilated, and eyes projecting with oscillatory movements of the globe. Both children recovered.

REMEDIAL EMPLOYMENT. Neuralgia.—Bardsley was the first to employ veratria in sciatica, an affection which is usually regarded as neuralgic, but which is much more frequently of a rheumatic nature i. e., produced by cold, and consisting of an inflammation of the fibrous investment of the nerve, as it passes through the ischiatic notch. He reported six cases of this affection, two of which were cured and four relieved by the administration of a quarter to half a grain of the medicine three times a day. In 1833 Turnbull claimed to have perfectly cured twelve out of thirteen cases of different forms of neuralgia by the external use of veratria ointment; but the evident exaggeration of his statements only served to discredit the remedy with judicious Dr. James Johnson furnished, however, a partial confirmation of them, by reporting that it had, in his hands, afforded relief in three cases of facial and two of crural neuralgia. Similar effects were reported by Brück, Ebers, and Roëll, who points out that the remedy is only efficacious in functional neuralgia, and by Cunier, who cured fortyone out of a hundred and twelve cases of the same affection. Gebhard's experience somewhat resembled that of Roëll, for he had found the frictions useful when the pain was diffused in the terminal branches, rather than when it was confined to the trunk of the nerve; and Lafargue regarded its effects, when inoculated, as extraordinary.* Like the physicians already cited, Forcke and Reil' found the remedy very efficient, both in frictions and when introduced by punctures into the skin, provided the disease were wholly functional. The latter regarded veratria and aconitia as the best substitutes for one another. It is somewhat remarkable that in opposition to this positive and authoritative testimony we have Dr. Henry Hunt declaring that he "never succeeded in giving even temporary ease with veratria," although he used it in the proportion of ten grains of the alkaloid to half an ounce of ointment.10 We believe that general experience accords decided virtues to the medicine as a local remedy, although it is probably inferior to aconitia, employed for the same purpose and in the same manner.

```
1 On Poisons, 2d Am. ed., p. 510.
```

^{*} Hospital Facts and Obs., 1830, p. 115.

⁶ Med.-Chir. Rev., xxi. 163.

⁷ Ibid., xxxiii. 255.

PRAGER Vierteljahrs., lxxi. 117.

Brit. and For. Rev., ii. 499.

Bull. de Thérap., xiv. 8; xv. 329.
 Ibid., p. 353.

⁹ Mat. med. der rein. chem. Pflanzenstoffe, p. 308.

¹⁰ On the Nature, &c., of Tic Douloureux (London, 1844), p. 184.

Rheumatism.—Of nineteen cases of chronic rheumatism which Bardsley treated by the internal use of veratria, three only are stated to have been cured, nine were relieved, and seven were unimproved. In so obstinate a disease, this degree of success is not without merit. Turnbull reports more cases of cure, but does not allude to those of failure. In acute rheumatism the medicine has been more successful. Among others, Piedagnel employed it alone in the articular form of this disease, with decided advantage, in doses varying from 10 to 1 gr.,1 and gradually increasing the dose until the medicine was no longer tolerated. M. Trousseau assures us that during two years he made use of this method with generally satisfactory results. He describes the most usual effect of it, as a reduction of the fever and pain in the course of a few days, so that in a patient of unimpaired constitution it frequently triumphed over an acute attack of the disease in the space of a week. Not, however, that it always accomplishes a cure; for sometimes, after having reduced the febrile symptoms to a subacute type, they continue their usual course for the space of two or three weeks. Its curative power, therefore, does not exceed that of sulphate of quinia and nitrate of potassa. The former of these two medicines also appears to be preferable when the patient is feeble, anemic, or exhausted by other diseases. M. Aran reports that of eight cases of acute articular rheumatism, the cure by veratria was very rapid in four, that the treatment was ineffectual in two cases, and that in two others it had to be abandoned, on account of the intolerance of its effects, by the patients. The duration of the disease, after the commencement of the treatment, was eight days, on an average, in the cases which were cured. On the whole, as M. Aran remarks, this result is far from being a very favorable one, particularly when it is considered how much distress the remedy occasions in nausea, vomiting, epigastric pains, prostration, &c. But this writer is of opinion that when articular rheumatism is complicated with pericarditis, the danger of the attack is sensibly lessened by the sedative operation of veratria.2

Pneumonia.—In this disease M. Aran, who was induced by Dr. Norwood's publications concerning veratrum viride to experiment with the medicine under notice, observed that when it was given in such doses as developed its irritant and sedative effects, a rapid and decided amelioration took place in several of the symptoms, and particularly in the dyspnœa, cough, and expectoration, and, what is peculiarly important, it caused the physical signs of hepatization to disappear with unusual rapidity. But the number of his cases, six in all, were insufficient for determining the precise value of the remedy. Fournier treated forty-one cases of the disease according to the same method, with such success, that he pronounces it the most certain means of promoting resolution; but Ghiglia is of opinion that it is seldom efficient, and ought not to be administered unless depletion has been premised.

Bull. de Thér., xliii. 141.

³ Ibid., xlv. 61.

Bull. de Thérap., lvi. 109.

² Bull. de Thérap., xlv. 395.

⁴ L'Union Méd., quoted by Reil, loc. cit.

Veratria has occasionally been used in acute pleurisy and pericarditis, in the former without notable advantage, but in the latter with marked alleviation of the præcordial distress. By producing a similar effect in some cases of valvular disease of the heart, it has been found a useful palliative; and in some instances of dropsy resulting from suppressed discharges, or from organic disease, it has seemed to promote the absorption and discharge of the effusion, probably by its sedative influence on the heart. But in all such cases it must occupy a very inferior position to digitalis. It has been used for these affections both internally and externally. In the latter mode, also, it is stated to have cured various chronic inflammations, such as enlarged glands, and scrofulous swelling of the joints; but here its value is probably very slight. It is unnecessary to add anything of its alleged occasional efficacy in whooping-cough, chorea, hysteria, and functional paralysis of the facial and other superficial nerves. For all of these affections the materia medica contains more certain and less disagreeable remedies for internal administration. In the last mentioned disease frictions with veratria ointment are deserving of trial.

ADMINISTRATION.—On account of its acrid taste, veratria is always administered internally in pilular form, and in doses varying from one-fortieth to one-fourth of a grain. The dose should be gradually or rapidly increased from the minimum mentioned, according to the acuteness and the nature of the disease, until nausea or depression of the pulse announces that its constitutional influence is established.

For external use it may be employed in solution, or mixed with lard or oil. From one to four grains of veratria in a fluidrachm of glycerin or alcohol, or four grains of the alkaloid to sixty grains of lard, may be prescribed. The latter preparation causes decided prickling and stinging of the skin. (Reil.) The officinal ointment of veratria (UNGUENTUM VERATRIX) contains twenty grains of the alkaloid to a troyounce of lard. For endermic use from one-eighth to one-half a grain may be prescribed, mixed with starch. For hypodermic inoculation one-sixth of a grain of veratria, or of its muriate, may be employed at a single operation, which may be repeated twice a day.

CLASS XI.

EVACUANTS.

EVACUANTS are medicines which produce discharges from certain organs. The greater number of them are included in the Class of Eliminants admitted by some modern writers, and particularly treated of by Mr. Headland. The latter term is, we think, less eligible than the former; for while it is certain that these medicines do produce evacuations from the various emunctories of the economy, it is not certain, and it by no means follows that they eliminate any material cause or element of disease.

The use of evacuants, which is coeval with the earliest history of our art, was undoubtedly suggested by the operation of nature in the cure of many diseases. It is of daily observation that convalescence is ushered in by discharges, especially from the skin, the bowels, and kidneys, and when it was discovered that certain plants and other natural agents excite or promote such discharges, they were instinctively employed to produce similar effects at the will of the physician. As it was a part of the existing pathological doctrines that the symptoms of diseases are the result of a struggle on the part of the system to expel some peccant humor from the body, evacuants were presumed to promote its expulsion, and in that manner contribute to the restoration of health.

The material causes of disease were not then demonstrated, nor, indeed, have the minutest investigations of modern chemistry and physiology succeeded in revealing them. But in following up medicinal substances in their hypothetical chase after the morbid principles they have been thought adapted to destroy, it has been found that those belonging to the present class are far from exerting their power upon all the excretory organs indifferently. The same laws which preside over the composition and decomposition of the organic elements of the body, prevail also here. As the different constituents of the food are appropriated, each after its kind, by the living bone, muscle, gland, or membrane; and as the unassimilable portions of the food are rejected, this by the skin, that by the bowels, and that by the kidneys, according to its peculiar constitution, different medicines are in like manner discharged by the several organs named, and by others, either

exclusively or principally. Solid nutriment, whether wholly or only in part unassimilable, is ultimately evacuated from the bowels; fatty substances, after having been taken into the circulation in the form of an emulsion, are secreted by the liver; liquids and saline matters pass off by the skin and kidneys; and among medicines some are discharged with the secretions of the bowels, some with those of the skin, the kidneys, or the bronchial mucous membrane. In thus passing from the body, as might indeed be anticipated, they stimulate to unusual activity the organs through which they are discharged, and increase their normal secretion so long as the stimulation is restrained within certain But once this bound exceeded, the secretion, instead of being promoted, is impeded and diminished, to such a degree, it may be, as to become a cause of disease and death. Thus cantharides, copaiba, or oil of turpentine, in appropriate doses, may augment the flow of urine, but in excess may arrest it altogether by occasioning congestion or inflammation of the kidneys. This proposition is not less applicable to those evacuants which operate both by absorption into the blood, and by their immediate and direct application to the organs they are adapted to stimulate, as, for example, certain emetics and cathartics. Their evacuant operation may depend, in a great measure, upon the reflex action excited by their presence as irritants in the stomach or Again, emmenagogues become evacuants in quite a different manner from those agents which augment secretion by directly stimulating a gland; some of them, as ergot and borax, influence the distended uterus chiefly, and others act by contiguous sympathy, or by a continuous irritation propagated from neighboring organs, as from the rectum in the case of aloes, and from the bladder in that of cantharides.

Allusion has been made above to the theory which was anciently invoked to explain the curative operation of evacuant medicines, and according to which they expelled from the system a material morbid principle upon which all the phenomena of disease were supposed to depend. But to any one who will carefully study the Hippocratic writings upon this subject it must be evident that no practical precept was more frequently enjoined or more profusely illustrated than the obligation to avoid any active interference with the process of coction, which was regarded as an essential preliminary to the due discharge of the morbid humor. The Greek physicians did not, as some of the present day propose to do, substitute the forced evacuation of a secretion for its natural flow. For them this was an operation to be respected; to be promoted and encouraged, indeed, but only when the efforts of nature were clearly tending to produce it. The ancient doctrine, therefore, cannot be invoked in support of the modern theory, or of the practice deduced from it, and which consists in the use of evacuant medicines without regard to the stage of the disease, or its natural tendency to a critical discharge. In other words, the preparation of the system for this evacuation, which was an essential part of the Hippocratic method, is now entirely overlooked, or rejected as unnecessary.

The ancient practice truly ministered to nature, the modern is a

rude, and what might well be called an impertinent, interference with the natural processes of cure when they tend to issue in a critical evacuation. But if we take a general survey of the mode in which health is restored after sickness, we shall find that it is rather by supporting and invigorating the functions of the economy, so as to enable it to resist the exhausting or oppressive influence of the morbid process, than by any evacuant operation whatever. To cite a striking illustration of this view, which has been suggested by Dr. C Handfield Jones, when a narcotic poison or the virus of a venomous serpent, for example, has been introduced into the system, no attempt is thought of directly to eliminate it, but stimulants are employed to sustain the powers of life during its operation, until the changes in the fluids, &c., which it tends to produce, have come to an end, or until it is cast forth: from the economy. This remark is quite as applicable to diseases which arise spontaneously, but whose active cause is acknowledged to be either a specific virus producing certain changes in the blood which have been hypothetically illustrated by the analogy of fermentation, or which, as Dr. Jones suggests, are rather morbid states of the blood itself, depending upon catalytic processes. The latter was precisely the doctrine of the medical world in the time of Huxham, when it was customary to speak of putrid fevers and putrefactive processes, a doctrine to which the success of the sustaining and stimulant treatment lent the most unequivocal support. All of the continued, including the eruptive, fevers belong to this category, some in a greater and some in a less degree, varying with the prevalent medical constitution. If occasionally, as in the case of typhoid fever, an evacuant treatment has been judged the most efficient, it has been so under the influence of a popular medical theory, or in comparison with other methods, such as depletion, which had more disasters to lament than triumphs to boast of.

Or if we inquire what method has been most successful in treating malarious disorders, in which, if anywhere, an eliminant treatment should have been successful, since their cause can hardly be denied to be a material poison, we shall still find that medicines such as cinchona and arsenic, which promote no sensible discharge whatever, constitute their surest and safest remedies. The history of syphilis presents another striking illustration of the doctrine here set forth. At one time it was believed that a venereal virus pervaded the system, which it required the full and prolonged sialagogue operation of mercury to eliminate; and the profuse and destructive salivations induced as a consequence of that belief are now a matter of history, and of little honor to the medical generations that practised them. Experience has proved, beyond all cavil, that mercury is most efficient in this disorder precisely when its eliminant effects are least decided.

If we turn to diseases of the skin, which are often, and sometimes probably with justice, regarded as depending upon and denoting a constitutional cachexia, we are still met by the fact that the most efficient means which can be employed for their cure consist of arsenical

Brit. Med. Journ.; Braithwaite's Retrospect (Am. ed.), xxxviii. 269.

and other remedies, which, when duly administered, are very far from promoting the secretions, or reducing the tone or vigor of the system. And although it might appear as if the great relief sometimes afforded by saline diuretics in the acute forms of rheumatism gave support to the opinion that they promote the discharge of a material morbid element, confidence in the doctrine must be greatly shaken when it is recollected that purgatives, of whatever sort, produce no such result, and that quinia, or, still better, cinchona, and, best of all, opium, are of equal, or rather, we should say, of superior, value to alkaline diuretics in the treatment of this disease.

Believing, then, that as eliminators of specific morbid principles medicines of the class about to be examined have no well-founded claim to confidence, we are compelled to fall back upon their more evident and intelligible actions to explain their great value as curative agents. These will be more profitably considered in connection with the several classes into which evacuants are divided according to the organs upon which they specifically exert their influence. As their general title implies, they are employed to remove from the economy certain matters which interfere with health. These may be mechanical causes of discomfort or disease, and may be expelled from the alimentary canal by emetics or cathartics; they may consist of a positive or relative excess of the circulating fluid, and the before mentioned agents, with diaphoretics and diuretics, are capable of rapidly reducing the turgor of the bloodvessels; they may arise from an imperfect action of secreting organs, whether secreting membranes or independent glands, whereby the materials for secretion are retained in the blood, and the functions which depend on the just amount of the latter are impaired; but evacuants restore the activity of the glandular organs, and relieve the blood of its excessive proportion of excretory elements. Some among the evacuants are chiefly local in their action, as certain purgatives and anthelmintics; but others, besides producing a general sedative effect through their depletory operation, act directly as sedatives upon the nervous system, and tend to prolong the influence of their more local irritant, and revulsive action. Such, for example, are tartar emetic, colchicum, black hellebore, and nitrate of potassa.

It will be found that not a few of the particular medicines classed as evacuants are such only when administered in a certain dose, or in a certain condition of the organs to which they are addressed. So purgatives are habitually employed to cure diarrhea, not merely by removing irritant causes from the bowels, but by a substitutive action arresting or diminishing the alvine secretions. The same is true of expectorants, of which a particular group has received the name of stimulant; and, in fact, it is also more or less true that nearly every class of evacuants might be conveniently divided into two sections, the one containing stimulant and the other sedative medicines.

EPISPASTICS, vid. Irritants.

no immediate effect is produced; but after a time a copious discharge of mucus, and even of blood, takes place. In this manner it has proved useful in cases of severe chronic headache, especially when the pain originated in inflammation of the frontal sinuses; of chronic inflammation of the eyes, paralytic affections of the mouth and tongue, in toothache, &c.

ADMINISTRATION.—As an emetic the dose is variously stated by authors as between twenty and sixty grains of the powdered leaves or root. As an errhine one or two grains of the root, or twice that quantity of the leaves, may be snuffed into the nostrils. It may also be mixed with ordinary snuff.

HELENIUM AUTUMNALE.—SNEEZEWORT.

This is a perennial herb indigenous to the United States, in all parts of which it grows abundantly in low and moist situations. The whole plant is intensely bitter, and somewhat acrid. When powdered and snuffed, it produces a profuse discharge of mucus, and violent sneezing. Every part of the plant is active, but the central disk florets are the most powerful.

Other errhines might be here described, such as ammonia, turpeth mineral, tobacco, green and white hellebore, and nearly all of the stimulant plants belonging to the natural families of Labiatæ and Euphorbiaceæ. But the more important of these will be found treated of elsewhere.

SIALAGOGUES.

Hydrargyrum,
Mezereum, Pyrethrum,
Tabacum,
Armoracia,
Zingiber,

vid. Alteratives.

- " Irritants.
- " Nervous Sedatives.
- " Diuretics.
- " Aromatic Stimulants.

EMETICS.

EMETICS, or medicines given to produce vomiting, are among the most ancient and the most universally and frequently employed of all remedial agents. The indication for their use which is most emphatically mentioned by Hippocrates is that which must originally have led to their administration in disease, a sense of oppression at the stomach, with nausea. Celsus makes use of similar terms; but Galen,

In order to appreciate more fully the phenomena of emesis, and the action of the causes which produce it, it is necessary to consider the nervous sympathies, or rather the nervous physical relations, of the stomach. It is supplied with branches of the vagi nerves, whose chief office appears to be to control the active movements of the muscular coat of the organ; for its peristaltic action continues even after the section of those nerves. It is also abundantly furnished with branches of the great solar plexus and other neighboring ganglia of the sympathetic nerve, which are most numerous in the pyloric half of the organ, while those of the par vagum chiefly supply its cardiac extremity. The sympathetic nerve appears to be endowed with the function of causing rhythmical movements in certain hollow viscera, by which term may be designated the heart and bloodvessels, the bronchial tubes, the urinary passages, the uterus and its appendages, the pharynx and œsophagus, and the gastro-intestinal canal. It is quite intelligible, therefore, that a strong impression made upon the stomach, the nerves of which appear, even anatomically, to hold a central position in the ganglionic system, should be reflected upon many other parts of the economy, and upon those particularly which are concerned in the processes of organic life, and that it should in an especial manner influence the action of the arteries and the secretions which immedi-

ately depend upon them.

This statement, general as it is, of the sympathies of the stomach, indicates the modes in which that organ may be influenced by impressions made upon distant parts, and, reciprocally, how its own state may affect them, and consequently how a strong and sudden commotion in it may become the means of essentially changing their condition and mode of action. As a hollow muscular organ, open at either end, it is capable of propelling its contents in either direction. In a normal state it carries them forward to the pylorus; but under the action of irritants, that is to say, of substances intrinsically unassimilable and productive of irritation, it sets up a retrograde action which tends to reject and expel them through the cesophagus. Such are the mineral emetics, sulphate of zinc, and sulphate of copper, and other substances which, although assimilable, yet in an undue quantity, produce an analogous action of the stomach, and stimulate it by their bulk as well as by their acrimony. Such agents are the domestic emetics, salt and mustard. It is well known, also, that mere repletion of the stomach with assimilable food is sufficient to excite vomiting. These effects are evidences of a wise provision against the dangers to which the stomach, one of the essential supports of life, is peculiarly exposed. Its degree of susceptibility to the irritant impression of ingesta, and especially of excessive quantities of food, varies in different persons even in health, and is generally most developed in those of a delicate organization, and in females more than in men. also awakened with great facility in children. In all of these cases, the stimulus which issues in the act of vomiting, is applied directly to the stomach itself. But in others, a remote irritation or exciting cause may produce the same effect. Tartar emetic, for example, which is the most powerful agent of its class when applied directly to the

When this is the case, the patient almost always awakes refreshed and relieved.

The mechanism by which these phenomena are produced consists partly of the contraction of the stomach itself, especially towards its pyloric extremity, but mainly of the pressure to which it is subjected by the diaphragm on the one hand becoming fixed by a suspension of breathing during a full inspiration, and on the other by the abdominal muscles contracting forcibly, so as to thrust the stomach, liver, and intestines against the diaphragm. In the very act of vomiting, the glottis is partially opened, as may be inferred both from the explosive noises which appear to issue from it, and the frequent entrance into it of portions of the matters vomited, which have then to be expelled by coughing.

The operation of emetics is manifold, and is both local and general. As local stimulants, emetics act by increasing the afflux of blood to the stomach; and, so long as their immediate impression does not exceed physiological limits, they necessarily render its functions more active, augmenting the secretion of its special glands, while they also tend to diminish whatever congestion of the neighboring organs, and especially of the great secreting viscera, may exist. But the throes of vomiting exercise a direct influence upon these organs, mechanically agitating and compressing them, and therefore both facilitating the discharge of whatever secretion their ducts may already contain, and promoting the formation of a more abundant and easily secreted fluid. Hence, emetics deserve to stand first on the list of deobstruent reme-In thus augmenting the discharge of the glands which are subservient to the function of digestion, they deprive the blood of a large quantity of fluid; not, indeed, as much as certain purgatives abstract, yet sufficient to be considered in estimating the sedative or antiphlogistic influence of the emetic treatment of disease. particularly is this important, when we remember that their direct sedative impression upon the system, if less permanent, is much more rapid and decided than that of purgative medicines. Nor is their depletory operation, by an increase of secretion, confined to the abdominal organs. The profuse diaphoresis which they sometimes provoke, the discharge of mucus and saliva from the fauces, and the rapid increase of the bronchial secretion under their influence, indicate other important channels in which the effects of their spoliative action are developed.

The direct sedative influence of emetic, but more particularly of antimonial medicines, is one of their most important operations, impressing, as it does, both the nervous and the arterial systems. The action upon the nervous system is chiefly manifested in the relaxation of muscular tension produced by various causes directly or indirectly irritating the muscular fibre. In spasmodic laryngitis it controls both the nervous and the vascular elements which constitute that affection, and it is not less efficient in relieving æsophageal spasm, overcoming rigidity of the os uteri, and relaxing the contraction of the muscles which oppose the reduction of a dislocated joint. Even when spasm affects a large portion of the muscular system, the relaxing influence

will not bear a moment's examination; for the products of animal and vegetable putrefaction could never be mucus of any description. The mucus, whatever its characters, can have but one source, the muciparous glands of the stomach. These, it is well known, are greatly enlarged in bilious fever and other forms of disease in which the so-called saburral state exists, and their enlargement is frequently associated with more or less thickening or softening, or both together, of the gastric mucous membrane. At the same time the tongue and gums are covered with a thick and pasty coating; the tongue itself is enlarged and flabby and indented with the teeth, and if the state continues, it gradually grows brown and dry; then its crust becomes fissured and ultimately peels off, leaving a raw, smooth, and dark-red epithelium exposed; the breath is also heavy, sour, or fetid. Accompanying this condition, there is also a greater or less degree of febrile movement, often limited to an evening exacerbation, yet usually manifest upon careful observation. In remittent fever, the existence of gastric inflammation, connected with these symptoms, is indicated by tenderness of the epigastrium, or even spontaneous distress in that region, by vomiting, usually of bilious matter, and by a high degree of fever, from which facts it appears to be only a reasonable conclusion that the state in question is a real and not a hypothetical one, and that it is the product of a process which, if not inflammatory in the sense of an inflammation produced by a direct irritant, such as arsenic or corrosive sublimate, is nevertheless essentially of that nature. Indeed, in the cases last named, the inflammation attacks the vascular rete of the mucous membrane, while in those especially under consideration as proper subjects of an emetic treatment, the glandular element is the seat of the peculiar alteration.

That emetics should be useful under such circumstances we must admit, not only as the result of direct experience in the gastric affections referred to, but also as a legitimate deduction from the admirable effects of stimulant remedies in follicular inflammation of the fauces and larynx, applied directly to these parts, and also from the utility of medicines addressed to the stomach in the same affections, and which were long successfully employed to cure them before the topical medication of the accessible parts came into vogue. Indeed, a principal cause of the frequent failure of the latter is that it is too often employed alone, and without a due consideration of the symptoms which point to derangement of the stomach itself.

If, now, we reflect upon the operation of emetics as thus far described, we shall find in it a probable explanation of their value in the affections which are characterized by enlargement and an altered secretion of the mucous follicles of the stomach, whether we prefer to call this state inflammatory, or regard it as a perversion of function only. That it cannot with propriety receive the former title, purely and simply, is plain, because it tends neither to interstitial effusion nor to ulceration; yet it must be admitted to be sometimes associated with diffuse inflammation of the mucous membrane, as in some fatal cases of bilious remittent fever.

The so-called stimulant action of emetics has been referred to as

1

trium, and the vomiting of everything which is swallowed, they would prove exceedingly mischievous, and, perhaps, fatally so. But, on the other hand, if the tongue is covered with a thick, pasty coating, of a sweetish, bitter, saltish, or sour taste; if the breath is heavy or fetid; if there exist a loathing of food, nausea, or straining, with a feeling of sinking or great oppression at the epigastrium, and eructations of a sour, acrid, or bitter liquid, and if, in addition to these symptoms, the complexion has an earthy or dull hue, and the sclerotica a muddy or jaundiced aspect, the propriety of administering an emetic cannot be for a moment doubted.

As regards the contraindications for the use of emetics, in addition to gastric inflammation or disorganization already mentioned, there are but few circumstances in which they are absolutely inadmissible. Undoubtedly, they should be cautiously employed in all cases of imminent hemorrhage from any organ, whether uterine, cerebral, pulmonary, or any other; but the absolute objection to them sometimes inculcated, appears to be based upon theoretical rather than upon practical grounds; for it does not appear that ipecacuanha, at least, has ever been charged with any disasters of the nature referred to, and if some rare instances of the sort have been alleged against tartar emetic, they should not be allowed to deprive us of the advantages derivable from other articles of the same class. It is well known that emetics have been successfully used to check pulmonary and uterine hemorrhage; and it is questionable whether a single instance of fatal consequences from this use of them is recorded. At the same time it is, perhaps, the part of prudence, in all of the disorders referred to, to make use of the milder and less exhausting articles of the class. Whenever a patient is affected with hernia, prolapsus of the rectum or uterus, enlargement of the abdomen from pregnancy, a hypertrophied organ, a morbid tumor, or even a large collection of fæces in the intestine, emetics are, indeed, not contraindicated, but should be circumspectly used, and the mildest articles of their class preferred.

As a general rule, nauseant emetics are unsuitable to persons advanced in life, because they depress the heart and tend to augment unduly the bronchial secretion; but mechanical emetics, such as sulphate of zinc, copper, or alum, may be administered without apprehension in appropriate cases. On the other hand, emetics are of all medicines the most useful in many diseases of children. Young persons vomit without much effort; indeed, it seems with infants to be a normal act for relieving an oppressed stomach, and many of the diseases incident to childhood are treated by no class of remedies so successfully as by these. Especially may they be regarded as a most precious resource in affections of the air-passages in early life. But this remark scarcely applies to tartar emetic, whose sedative powers are often developed in children with frightful violence and fatal effect, and by doses which, when prescribed, were expected to produce only nausea, or gentle vomiting at the most.

Something of a similar, and what may be called a poisonous effect of emetic medicines, is occasionally met with even among adults, and suggests caution in their use. Violent vomiting and purging and

mittent fever, and especially the vernal cases, may often be cured by these medicines alone; as Fothergill expresses it, "their operation seems something wonderful." As regards autumnal fevers, and in proportion as they assume a bilious type, the same treatment is invaluable in many cases which refuse to yield to the administration of quinia alone. It must have happened to every physician to meet with instances of the disease for which bark seemed to have lost its virtues, until an emetic, perhaps combined with a cathartic, placed the system in a condition favorable for the action of the specific remedy. In many cases, also, when an irregularity of the paroxysms, whether of degree of development, or in the order of succession of the stages, or when some other departure from the normal type exists, the operation of an emetic restores the phenomena to their due sequence and proportion, and renders the disease easily curable by the specific remedies.

Inflammations.—There are few inflammatory affections in which emetics are not serviceable by one or another of their modes of operation, but in nearly all their utility is most conspicuous, as it is in idiopathic fevers, before the full development of the attack. It is enhanced in the greater number of diseases of this class, by the previous employment of depletory measures. Emetics sometimes avail to arrest the development, or render comparatively tractable, even so formidable a disease as meningitis, when prescribed during its forming stage. Of their use in spasmodic laryngitis, comprising an inflammatory and a nervous element, we have already spoken; and in pseudomembranous laryngitis, nauseant emetics are valuable during the first stage for limiting and restraining the violence of the inflammation, and subsequently, mechanical emetics for expelling the obstructions of the air-passages. Quite an analogous mode of operation is displayed by these remedies in bronchitis and influenza, that is to say, they promote the bronchial secretions, and at the same time occasion their discharge; and the mechanical emetics are of the greatest value in those forms of bronchial disease, such as bronchorrhæa, in which the inflammatory element is slight, or null, but the amount of secretion excessive. Cases are on record in which the administration of an emetic by the rectum, or its injection into the veins, has caused the expulsion of a foreign body lodged in the larynx; and the same means have been used to clear the air-passages of newborn children of mucus, and thereby dissipate the asphyxia which would else have proved fatal. The forming stage of tubercular phthisis has been treated by emetics with alleged advantage. They are presumed to have been useful by their tending to produce the elimination of the imperfectly concreted tuberculous matter. In pneumonia, after the first stage, the sedative action of emetics is chiefly to be regarded, and, indeed, it is less as an emetic than as a sedative that antimony has been supposed to be valuable in this affection.

In inflammations of the digestive organs the uses of emetics are manifold. No other remedy acts so promptly to cure tonsillitis, parotitis, ulcerative stomatitis, and aphthæ, or follicular ulceration of the mouth. The affections of the stomach which are benefited by emetics have

the grade of their action, the mildest being oil and tepid water, or bitter infusions, which operate chiefly by their bulk, but somewhat by their nauseous taste; then follow mechanical emetics, so called, including the sulphates of copper, zinc, and iron, and the sulphuret of mercury; next to these, horseradish, mustard, and squills, which nauseate but do not depress; ipecacuanha might then be considered, standing almost alone in its peculiarities, but more analogous to squill than to any other of its associated medicines; and finally, white hellebore, tobacco, and tartar emetic might be grouped together as being all powerful sedatives and emeto-cathartics. But the greater number of the substances now enumerated belong to other classes of the materia medica, the expectorants, diaphoretics, nervous sedatives, irritants, &c., and it would, therefore, be inconvenient and unprofitable to introduce a description of them into the present division of the work. Their emetic virtues will be found treated of in connection with the several articles which have been named.

The unequal degrees of emetic effect possessed by these medicines, and the different actions conjoined with it, render it impossible to substitute one for another indifferently in the treatment of disease. it be intended merely to evacuate the stomach without inducing any constitutional effect, some one of the group of mechanical emetics which act by their bulk or by their local irritation only, or one of the irritant group which nauseate but slightly, should be preferred; but if a constitutional effect involving the condition of the nervous system, the circulation, and the secretions is desired, then some of the nauseant articles will be selected, and, according to the nature of the case, those which produce a slight and transient, or a profound and prolonged depression of the economy. Of this last group, ipecacuanha stands on one side, and tartar emetic on the other. The former should generally be preferred when the patient is young or delicate, and when the bowels are relaxed; the latter is more appropriate for robust and plethoric persons, when it is intended to agitate the whole system, and when a purgative operation, in addition to emesis, is sought to be produced.

The Administration of Emetics.—The mode in which emetics should be administered will depend upon the object in view. When it is proposed merely to evacuate the stomach, as when some poisonous agent or improper food has been taken, a large quantity of lukewarm water, or of a weak, bitter infusion, should be given in frequent and copious draughts, so as to produce the most rapid discharge of the offending substance, with the least possible irritation of the organ itself. Or one of the mechanical emetics may be administered, and after vomiting has commenced, draughts of the diluent liquids referred to will be found useful in sustaining while it moderates the operation. In such cases ipecacuanha may also be employed alone, or in conjunction with other emetic substances, if they should prove insufficient of themselves, and in all such cases the full dose judged necessary should be administered at once.

But when it is intended to make a strong impression upon the system, by means of the perturbative action of the medicine, to promote

amples are not wanting of death produced by sulphate of zinc, yet the number of them is small. In general, the emetic quality of the medicine insures the speedy rejection of a large dose, or at least of its greater part. Large doses of it (thirty grains or more) produce a styptic taste in the mouth, constriction of the fauces, pain in the stomach and bowels, retching, violent vomiting, purging, distress, thirst, a contracted pulse, cold extremities, and sometimes death.

Dr. Brennan has reported the case of a man who took four ounces of sulphate of zinc in mistake for Epsom salts. It was dissolved in five ounces of warm water. Immediately he experienced a sense of violent distension in the head, was seized with coldness, shivering, and prostration; his features were contracted and of a leaden hue, and he felt a choking sensation with constriction around the chest. Spasms affected the eyeballs and upper extremities; there was tenderness in the throat, epigastrium, and abdomen; the respiration was 15 and feeble, the pulse 60 and languid, and there was incessant vomiting and purging. The mind was clear, and the patient recovered. Diarrhea continued for several days.² In a case which proved fatal on the fifth day after the drinking of a wineglassful of a concentrated solution of this salt, no morbid appearances were detected, except patches of red inflammation of the mucous membrane of the pyloric end of the stomach and of the duodenum.³

The secondary effects of the medicine, or those which result from its absorption, rank it among tonics and astringents. Probably, as a still more remote effect, its action is antispasmodic. It has also been thought to exert a specific action upon the bronchial tubes, by diminishing the secretion of their mucous membrane.

Uses. Externally.—It is chiefly employed for the sake of its astringent qualities, and both in solution and in the form of an ointment. The former is frequently used in subacute or chronic inflammations of the conjunctiva, of the auditory and nasal passages, the throat, vagina, and urethra, and also after the extirpation of polypi from any of these parts. Michaelis highly recommended a wash composed of this substance with extract of cinchona, catechu, and honey of roses, in the treatment of cancrum oris. Armstrong and others employed it successfully for the cure of aphthæ. The strength of the solution employed must be determined by the sensibility of the inflamed membrane. In ophthalmia collyria should seldom contain more than one grain of the salt to an ounce of water, and the same proportion is suitable in gonorrhæa. For leucorrhæa, a somewhat stronger preparation is more effectual. Wishart employed successfully the following solution in ophthalmia neonatorum: B.—Sulph. zinci gr. xx; aquæ 3x; liq. plumbi subacet. gr. xxx; tinct. camphoræ f3j-ij. A portion of this mixture was injected between the lids by means of a syringe, from three to six times a day. As an application to the nasal passages, to the mucous membrane of the mouth, throat, &c., a solution of ten grains to the ounce is not too strong. It has been

¹ Wibner, Wirkung, &c., v. 468.

* Lancet, July, 1855, p. 52.

<sup>Times and Gaz., Sept. 1862, p. 252.
Edinb. Med. and Surg. Jour., Oct. 1829, p. 253.</sup>

used successfully to arrest coryza in its forming stage, as well as to moderate an excessive purulent discharge from the nostrils. Injections of a solution of the salt into the bladder have also served to arrest hemorrhage from this organ. In epistaxis a plug of cotton wool covered with finely-powdered sulphate of zinc has been successfully employed. In chronic discharges from the genito-urinary organs of either sex it has been recommended as an internal medicine. Injections of sulphate of zinc dissolved in water have been successfully employed to arrest uterine hemorrhage, but they are probably more effectual in bleeding from fungous growths of the uterus or vagina. It may also be used to arrest hæmorrhoidal discharges. Polypi of the nostrils have been made to shrivel by means of insufflations of powdered sulphate of zinc, so that they could be more readily extirpated by means of the forceps. As before remarked, a solution of the salt has been employed to prevent the reproduction of such tumors. Lisfranc had recourse to a solution of the sulphate (gr. lx to 3j), which he applied lightly by means of a camel's hair pencil after the inflammation caused by the removal of the polypus had subsided.' It has also been employed to prepare washes and ointments in a variety of cutaneous affections, particularly chronic eczema and scabies.

Dr. J. Y. Simpson has recommended anhydrous and finely-levigated sulphate of zinc made into a paste with glycerin (glycerin gr. lx; prepared sulphate of zinc 3j), or with lard (lard gr. cxx; prepared sulphate of zinc 3j), as a caustic application to indurated ulcers of the cervix uleri, lupus of the face, impetigo rodens, sensitive tumors of the female wethra, condylomata, &c. It will not act upon parts covered with cuticle or epithelium, but on the denuded tissue beneath it produces severe burning pain, which may be palliated by applying along with it a salt of morphia. Its eschar is stated to separate more rapidly than that of most other caustics, viz., on the fifth or sixth day, and it is further recommended by its perfect safety and its having no tendency

to deliquesce or spread.

Internally.—This substance was formerly much more employed than at present as an emetic. It was used especially, in doses of from ten to twenty grains, for the purpose of evacuating the stomach, without producing nausea or diarrhoea, in cases of narcotic poisoning, indigestion, ac. Some writers, indeed, as Gmelin and Moseley, contend that it rather fortifies the stomach than weakens it; but this opinion may very plausibly be questioned. On account of its mechanical mode of producing emesis it has been much employed in croup to promote the expulsion of false membranes from the air-passages. One of the earliest instances of its successful use for this purpose occurred in the practice of Dr. Francis, of New York. It is also reported to have been very efficient in curing epidemic diphtheria.

Sulphate of zinc has been much used as an astringent in chronic affections of the bowels attended with diarrhoea. Moseley attached great importance to it in the treatment of tropical dysentery, but as he

¹ Bull. de Thérap., xviii. 213.

Bosack's Essays, ii. 170.

<sup>Times and Gaz., Jan. 1857, p. 56.
Boston Jour., Feb. 1862, p. 31.</sup>

VOL. 11.—22

prescribed it in combination with alum and cochineal, its precise efficacy cannot readily be inferred. Baumgartner employed it in typhoid fever with the object of healing the intestinal ulcers which have erroneously been looked upon as the starting point of the symptoms of the disease. So far as these local lesions are concerned, it may undoubtedly promote their cicatrization, while it strengthens the nervous system and moderates the diarrhoea. Baumgartner prescribed it in solution, and in doses of two or three grains three times a day. In obstinate intermittent fever it sometimes proves efficacious.

W. Phillip alleged that sulphate of zinc is useful in certain forms of dyspepsia, but the cases in which he found it so are not very distinctly described. They were such, probably, as those in which the medicine was recommended by Moseley and by Strong, cases distinguished by constipation and by flatulent distension after meals. Dr. Strong directed a pill containing three grains of the medicine to be taken four or five times in twenty-four hours. From the general efficacy of tonics in removing this form of disease, and, contrary to prevalent opinions, in overcoming a constipated state of the bowels,

the utility of the sulphate of zinc may be readily understood.

Sulphate of zinc has been highly recommended in several nervous disorders. In some cases of nervous palpitation of the heart it has seemed beneficial. Spasmodic asthma, spasmodic coughs, and even whooping-cough, are said to have yielded to it. Dr. Fuller, in 1847, . employed it in fifty-seven cases of the last-mentioned disease, and found it to give speedy relief in all but four of them. Subsequently, in 1858, he associated belladonna and zinc, with greatly superior results. He prescribed half a grain or a grain of sulphate of zinc and a sixth of a grain of extract of belladonna every three or four hours, increasing the total quantity every day or every alternate day by one grain of sulphate of zinc and one-sixth of a grain of belladonna, until the quantity taken daily amounted to from six to sixty grains of zino and from two to six grains of the extract of belladonna, according to the age of the patient. If the dose is very gradually increased, it will not occasion sickness. That the efficacy of this compound treatment is mainly due to the belladonna which enters into it, does not admit of a doubt. (Vid. Belladonna.)

Under the administration of sulphate of zinc numerous cures of chorea have been effected. Dr. Hughes has published a summary of sixty-three cases of this disease in which it was administered, and of that number forty-five recovered. The dose given at first was two grains three times a day, and it was afterwards gradually increased until in some instances no less than thirty-six grains were taken at a dose. Romberg' says that it has not merited much praise in the cases that have fallen under his observation, and this statement accords with the more recent results arrived at by Mr. Stone, who compared the

On Tropical Diseases, p. 402, and al. RICHTER, op. cit., suppl. Bd. p. 569. Edinb. Med. and Surg. Jour., Oct. 1842, p. 408.

⁴ Moseley, op. cit., p. 558; Times and Gaz., Feb. 1862, p. 109.

Dis. of the Chest, p. 335.

Guy's Hospital Reports, 1846.

Diseases of the Nervous System, p. 75.

curative operation of sulphate of zinc, arsenite of potash, and ferruginous preparations in groups of cases amounting to fifty in all. The result failed to confirm the usual estimate of the value of sulphate of zinc in this disorder. The iron seemed to act more certainly, and the arsenic both more certainly and more rapidly, than zinc.

ADMINISTRATION.—As an emetic, sulphate of zinc may be given in doses of from ten to thirty or forty grains. For other internal uses, two grains three times a day may be prescribed, and the quantity gradually increased until it reaches twenty or more grains. For external application, the ordinary strength of the solution of this salt should be from one to three or four grains to a fluidounce of water.

ANTIMONII ET POTASSÆ TARTRAS.—TARTRATE OF ANTIMONY AND POTASSA; TARTAR EMETIC.

DESCRIPTION.—Tartrate of antimony and potash is prepared by boiling water and bitartrate of potassa with oxide of antimony. is in the form of transparent, colorless crystals, which possess a nauseous, metallic, styptic taste, and have usually the form of rhombic octohedrons. When exposed to the air, they effloresce slightly and become white and opaque. In the shops it is found as an amorphous powder. It is insoluble in alcohol, but dissolves in proof spirit and wine. It also dissolves in about fifteen parts of water at 60° F, and in between two and three parts of boiling water." Its aqueous solution reddens litmus slightly, and, when kept for some time, undergoes decomposition, and forms a soft, flexible, mucilaginous mass, composed chiefly of algaceous plants. "It is incompatible with acids, with alkalies and their carbonates, with some of the earths and metals, with chloride of calcium, and with acetate and subacetate of lead." It is also incompatible with astringent vegetable infusions and decoctions; but they do not, unless the preparations of galls be exceptions, render it inert, although they lessen its activity.

Vinum Antimonii.—WINE OF ANTIMONY.

It is prepared by dissolving thirty-two grains of tartrate of antimony and potassa in a fluidounce of boiling distilled water, and adding sufficient sherry wine to make it measure a pint.

History.—The origin of the word antimony is uncertain. It is, indeed, commonly said that the chemist and monk Basil Valentine poisoned a number of his brethren by purging them too much with it; hence in French it might significantly be called antimoine. The story is elsewhere told with some variations. A German monk, Valentine, having thrown to the pigs some antimony which he had used to promote the melting of other metals, found that, although it purged the animals very actively, they nevertheless grew fat. But on trying the same experiment upon his brethren, the monks, he met with such indifferent success that they all died. It is more probable that the

¹ Times and Gaz., Sept. 1859, p. 281.

² Allston, Mat. Med., i. 295.

³ Querelles Littéraires, iv. 52.

word is a corruption or imitation of the Arabian term for this metal, atimad.

The first mention of the medicinal virtues of antimony was by Basil Valentine. He seems to have been acquainted with the teroxide (flores antimonii), the red sulphuret (sulphur of antimony), and the terchloride (butter) of antimony. This was at the close of the fifteenth or at the beginning of the sixteenth century. Paracelsus, who lived at the same period, contributed much to bring antimonial medicines into vogue, but he also helped to divide the medical profession into two hostile camps, which for a long time carried on a furious contest relative to these preparations. So bitterly were their partisans denounced, that in 1566 the opponents of the medicine succeeded in obtaining a decree of the Faculty of Physic at Paris, backed by an act of the Parliament, which condemned antimony as a poison, and prohibited its use. timonials continued, notwithstanding, to be used, but probably by irregular practitioners, for as late as 1609 a physician named Besnier was expelled from the Faculty for having prescribed them. In 1637, however, antimony was received into the official codex, or pharmacopœia, as a purgative, and thirty years later (1666) the original decree against the remedy was rescinded by the Parliament, upon the petition of the Medical Faculty itself. During the period of this controversy (1619), Mark Cornacchini, Professor in the University of Pisa, announced as almost a panacea, and soon brought into vogue, a powder composed by the Earl of Warwick, and which consisted of scammony, sulphuret of antimony, and cream of tartar. Very probably, by observing the reaction of these substances, Mynsicht, of Mechlinburg, was led to the discovery, in 1631, of the preparation of antimony which forms the subject of this article, and to which he gave the name of tartar emetic.

On Animals.—Viborg found' that when this substance was injected into the veins of horses in doses of from twelve to thirty grains, it occasioned a frequent and small pulse, trembling and twitching of the muscles of the skin, gaping, and a drooping look. On the injection of sixty grains the symptoms were very striking. The pulse grew very frequent, and the breathing spasmodic and noisy; there were thin dejections, a copious secretion of sweat, tears, and saliva; automatic movements of the lips and of the tongue, as in the act of licking, a grinding movement of the lower jaw, restlessness, stretching of the limbs, scratching of the flanks with the hinder feet, repeated movements of the head towards the same parts, and tremulousness with spasms of the shoulders, neck, and hams. When the quantity injected reached one hundred and twenty grains, the symptoms were sudden and violent. They consisted of cramps, vertigo, paralysis, and death within three hours. According to Lappe and Hertwich, when the substance was administered by the stomach in doses of one or two drachms every three or four hours, there occurred, sooner or later, diarrhœa, debility, increased secretion from the mucous membranes,

^{&#}x27; Allston, loc. cit.

Biographie Universelle, ix. 597.

² Sprengel, Hist. de la Méd., iii. 121.

WIBMER, Wirkung, &c., v. 187, 194.

On Man.—Endermically. The first idea of administering tartar emetic by the skin was suggested by Blizard, but the earliest application of it to the treatment of internal diseases was made by Mr. Sherwen, in 1787. According to him, if a solution of tartar emetic is rubbed into the palms of the hands it produces a burning sensation in those parts, with nausea, perspiration, rumbling of the bowels, and diarrhoa. In some cases there is an increased discharge of urine. Gaitshell, who soon afterwards repeated these experiments, obtained no such results. He only produced a copious eruption of pustules which he was the first to describe as an effect of tartar emetic. The last observation was confirmed by Bradley, in 1793, who, however, denied that the solution produced even general diaphoresis. Hutchinson, on the other hand, in 1795, corroborated in the main Sherwen's

sion of the paunch, and grinding of the teeth, as effects of the medicine

given to sheep. By experiments upon cats, dogs, &c., it has been

found that its specific effects were produced by injecting a solution of

it into the cellular tissue; i. e., there was vomiting, with depression,

&c.; the gastro-intestinal mucous membrane was found injected, and

there was much congestion of the lungs.

^{&#}x27; Times and Gaz., May, 1856, p. 473.

Memoirs of Lond. Med. Soc., ii. 390.

⁵ Ibid., p. 247.

² Liverpool Med. Jour., Jan. 1857, p. 43.

⁴ Ibid., iv. 79.

⁶ Ibid., v. 81.

The absorption of this medicine by the tissues, and its circulation through the system, may be further illustrated by one or two examples. A dose of tartar emetic was administered to a nursing-woman suffering from pleurisy; when next the child took the breast it was seized with active vomiting.¹ Orfila,² as an ordinary result of his experiments, found traces of antimony in the liver, kidneys, and urine of the animals employed. He also in several instances detected a considerable quantity of this substance in the urine of patients who had been taking large doses of it.

The experiments of Lieberkühn, Fontana, Magendie, Dupuy, and others, show that even when a solution of tartar emetic is injected into the veins, its principal effects are manifested in the stomach. Several cases are collected by Wibmer, in which this method was employed to cause the expulsion of foreign bodies lodged in the esophagus. From these examples it would appear that the promptness of the effect was not in proportion to the quantity of tartar emetic employed. Thus, in four cases the quantities injected were severally six, four, three, and two grains, but the periods at which vomiting commenced were respectively thirty, one, fifteen, and fifteen minutes. Given by enema

this medicine purges, and sometimes vomits also.

Internally. Small Doses.—Mayerhoffer, who seems to have conducted his experiments carefully, asserts that the repeated use of even so small a dose as the one-hundredth of a grain occasioned a sensible derangement of the functions, which, however, became more distinct as the dose approached one grain. When the quantity was gradually augmented until an emetic dose was reached, the following effects were observed: The malaise and nausea, which had before existed, increased, with frequent eructation, and retching followed by vomiting; the stools were frothy, and consisted of mucus and bile; the abdomen was distended and painful; the urine, which at first had been copious, became scanty; the region of the liver was tender upon pressure; rumbling and cooing sounds proceeded from the abdomen, which was the seat of tearing, cutting, and griping pains; there were pains also in the lower limbs. There was an increased sense of warmth, alternating with chilliness, over the whole body, and the skin itched. Anorexia was complete, and if any food was taken, it renewed the The throat felt raw, and deglutition was somewhat difficult nausea. and painful. The tongue was covered with dirty mucus, and there was a pasty and insipid taste in the mouth. A sense of fulness was perceived in the chest, and the head felt heavy, dull, and oppressed. There was also a transient but irritating pustular eruption of the skin. The same fact is stated by Lohmeier, who also mentions pain in the genitals and total impotency among the symptoms. The proportion of fibrin in the blood is also diminished.

When the dose is large enough to produce vomiting, various general symptoms precede, accompany, and follow this act. Such are a copious secretion of mucus and saliva in the mouth; eructation of a

Lancet, Mar. 1846, pp. 361, 362.

¹ Wibner, Wirkung, &c. ² Toxicologie, i. 618. ³ Op. cit., v. 180.

⁴ Böcker, Beiträge zur Heilkunde (Crefeld, 1849), ii. 372.

ingestion of 120 grains of this substance, and on the other hand, several fatal cases are recorded, occurring in children, where ten grains, or less of it, have been taken. In several of these cases, the poisonous dose did not exceed a quarter of a grain, but the patients were already weakened by disease. Merei, of Pesth, met with several cases of death in children from profuse diarrhoea provoked by tartar emetic. The patients did not vomit, but had twenty or thirty stools in rapid succession, followed by fatal collapse.2 The writer has known a dose of not more than half a grain produce violent vomiting and purging, and a state closely resembling the collapse of cholera. The patient was an insane female, whose general health, however, was perfect. There is a case on record in which two grains given to an adult, proved fatal after producing violent symptoms. The patient would seem to have been laboring under functional dyspepsia produced by No lesion of the stomach was found after death.3 mental causes. case is also recorded in which repeated doses of a solution of this substance given to a robust child three years of age, for the relief of asthma, produced hyper-emesis and catharsis, collapse and death. Two fatal cases in children, in which three quarters of a grain was the dose taken, are reported by Mr. Wilton. Three cases are related by Hulot, in which three grains, one grain, and two grains were the quantities given. But although taken in divided doses, such violent symptoms and extreme prostration followed as rendered death imminent. In a case by Dr. Pollock, and which occurred in Italy, a native of that country, robust, and in full health, was destroyed by sixty grains of tartar emetic.7

The phenomena of poisoning by tartar emetic may be described as follows: The patient is attacked with pain in the stomach, followed by incessant retching, præcordial cramps and burning heat, distension of the epigastrium, severe colic, watery and frequent stools, dryness of the throat, difficult deglutition, an unpleasant metallic taste in the mouth, and sometimes a copious discharge of saliva. The muscles of the neck, jaws, abdomen, and extremities are more or less rigid; and sometimes there is active delirium: Generally the skin is pale and cool, and covered with a clammy perspiration; there is complete prostration of the strength, and sometimes repeated fainting or prolonged insensibility; the pulse is small, weak, contracted, and after being at first infrequent, falling, perhaps, to thirty-four in the minute, it afterwards becomes rapid, thready, and almost imperceptible. condition death may take place. The frequency of respiration is generally diminished, and may be reduced to five or six in a minute. Even where recovery ultimately ensues, the rate of the breathing, and of the pulse also, may continue to be slow for several days. Although such effects as have been described do really take place, it is, at the same

¹ BECK, Infant Therapeutics, p. 35.

^{*} Month. Jour. of Med. Sci., Oct. 1850, p. 368.

³ Archives Gén., xxvi. 262.
4 Boston Med. and Surg. Jour., 1849.

TAYLOR, On Poisons, 2d Am. ed., p. 476. Archives Gén., 5ème sér., i. 474.

⁷ Lond. Med. Gaz., May, 1850, p. 801.

Two instances of Tetanic Symptoms caused by Antimony. By Dr. Kliiotson, Times and Gaz., July, 1856, p. 6.

membrane ceases by degrees to respond to the impression of the medicine, having been rendered by it obtuse to the action of all stimulants; hence, obstinate constipation generally results from its use. When tolerance is established with difficulty, it is generally of short duration, and if then the use of the medicine be persisted in, derangement of the stomach and bowels supervenes. In such cases it is probable that it produces its specific inflammation of the gastro-intestinal mucous membrane (presently to be described), which, causing the tartar emetic to be rejected from the system, prevents the establishment of its proper sedative action. Tolerance is not easily established, nor does it last long, in females and children. In the latter class of patients its duration is peculiarly brief, and is apt to be followed by exhausting discharges.

Local Effects of Large Doses.—A burning sensation with constriction is felt in the pharynx and cesophagus, with swelling, dryness, heat, and redness of the posterior fauces; there is difficult deglutition and a disagreeable metallic taste; later, upon the half arches, the velum, the pharynx, the edges of the tongue, and the cheeks, ulcers make their appearance. They are generally one or two lines, but sometimes half an inch, in diameter, except upon the dorsum of the tongue, where they are usually linear, and are covered with a deposit resembling false membrane. This pellicular inflammation sometimes extends to the soft palate, tonsils, and pharynx. Boudet observed this condition in twenty-six out of a hundred and forty-four cases of pneumonia treated with tartar emetic, and in only five of these was the upper portion of the air-passages completely unaffected.* In certain cases a pustular eruption is developed in the mouth and pharynx having the general characters of aphthæ, but in some it is identical with that produced by tartar emetic upon the skin. It is said to appear about the fourth or fifth day of the treatment, and, according to some writers, in nine-tenths of the cases in which this agent is given in large doses.

Internal Lesions.—Hoffmann relates a fatal case of poisoning by tartar emetic in which sphacelus of the stomach and of several adjacent organs was found after death.³ This statement wants confirmation. In a case reported by Recamier, the peritoneum was injected, the mucous membrane of the stomach tumid, red, and covered with tenacious mucus. In addition to these alterations may be mentioned softening of the gastric mucous membrane, with hypertrophy and ulceration of the muciparous follicles of the stomach and the lower portion of the cesophagus. Engel describes ulceration both of the agminated and of the solitary intestinal glands, or rather of the mucous membrane covering them. Durand-Fardel reports a case in which a pseudo-membranous exudation covering the whole pharynx and cesophagus was found.⁴ None of these lesions occur frequently; all of them, indeed, may be regarded as exceptional, since several writers who have had large experience in the use of tartar emetic

¹ Trousseau and Pidoux, op. cit., ii. 729.

³ ORFILA, Toxicologie, i. 624.

² CARSTATT'S Jahresbericht, f. 1853.

⁴ Bull. de Thérap., xxv. 370.

"The head being particularly affected in this sort of fever [typhus]; the patient is extremely restless and delirious, especially at night; and there is a medicine which has a most pleasing effect in procuring both rest and perspiration. This is a combination of an opiate with an antimonial medicine, which was administered in the evening with great success." Almost exactly the same indications are furnished by Graves; he advises this combination in the class of cases of typhus in which, at an advanced stage of the attack, there is cerebral excitement, and determination to the head, with total want of sleep, persistent delirium sometimes of a furious kind, &c. A quarter of a grain of tartar emetic given every hour until the excitement subsides, and after this an opiate medicine, seem to dissipate the alarming symptoms, and pave the way to recovery. These cases are certainly exceptional in the history of petechial typhus, so much so that there is reason to suspect that in those referred to by Dr. Graves some cerebral complication must have existed, for, as a general rule, the disease is, of all others, the most intolerant of sedative medicines. Eruptive fevers call for great caution in the use of this remedy; indeed, the safer rule would probably be to exclude it altogether from their treatment. If, at any time, they are judged to require the use of an emetic, one of a stimulating sort would be preferable. It is comparatively an old method to prescribe tartar emetic before the commencement of the treatment by bark and its preparations in intermittent fever. But certain modern writers have recommended it in doses large enough to produce tolerance by their repetition, and claim to have found the method a successful one. That it may sometimes have cut short the disease by a profound and violent agitation of the whole economy, and in this way have prevented a recurrence of the paroxysm, must be admitted, since the same result has followed the employment of many remedies which have certainly no antiperiodic virtues. But the emetic plan has repeatedly failed altogether, and cannot deserve much regard when remedies of so much greater efficacy are within reach. But when, as often happens, the attack is preceded by gastric derangement, sallowness of the skin, and an icterode tinge of the eye, emesis is the best introduction to a cure; but even under these circumstances a vegetable is preserable to an antimonial emetic. Vernal intermittent fever may sometimes be cured by such emetics alone.

Pneumonia.—The treatment of this disease by tartar emetic was used in Great Britain by Balfour about the year 1818.² In this country it was used by Dr. McCall, of Tennessee, in 1821; but it does not seem either at that time, or subsequently, to have attracted much attention from American practitioners. In England, too, the method was adopted tardily, and with great hesitation, even after Mackintosh and Dr. Stokes had written in its favor, and to the present

¹ Clinical Medicine, p. 128 et seq.

He regarded the medicine as to a great extent a substitute for depletion, alleging that in many cases of local inflammation "a speedy and perfect cure can be obtained with the loss of so moderate a quantity of blood as to warrant the conclusion that bleeding might be safely omitted altogether, even in circumstances in which it is generally considered the only means of saving the patient's life."—Illustrations of the Power of Emetic Tartar, p. 8.

day it is justly regarded with suspicion. Dr. Stokes, even, did not depend upon it exclusively, but always considered it as secondary to general and local bleeding. He saw correctly that it was more effectual before than after hepatization is complete, and also confirmed the Rasorian doctrine to the extent of showing that although the first doses of the medicine produce vomiting and purging, these effects generally subside after twenty-four hours, when, as he remarked, might be witnessed the interesting circumstance of a patient taking from eight to twelve grains of the remedy daily without vomiting, purging, or sweating, or, indeed, any effect save the gradual removal of the pneumonia. Dr. Stokes prescribed the medicine in doses such as were recommended by Laennec, and in this respect, as well as in his estimate of its efficacy, Dr. Williams agreed with both of the physicians named. Dr. Copland, and Dr. Davies, who employed it in a very methodical manner, but in smaller doses at first than were needful, Dr. Blakiston, and Dr. Walshe, who declares that if he were forced to surrender either cupping and tartar emetic or general bleeding, in the treatment of pneumonia, he should not hesitate to relinquish the last, are the principal English authorities, in addition to those before mentioned, who advocate the use of tartar emetic in the treatment of pneumonia. But none of them has given such detailed accounts of its effects as will enable us to determine its precise value either as compared with other remedies, or with a purely expectant treatment. This has been done in a very satisfactory manner by M. Grisolle in his classical work upon pneumonia, and from it we must mainly draw the materials for a definite and rational judgment of the

It was shown by Rasori, 1. That pneumonia may be treated throughout its entire course by tartar emetic; 2. That the cure may be confided to it chiefly or alone; 3. That by its use depletion may be greatly lessened or entirely dispensed with; 4. That it may be given in what seem enormous doses, as twenty-four grains in as many hours, or two ounces in the course of the attack; 5. That these doses produce neither vomiting nor purging, nor any serious disturbance of the digestive organs, but a state of tolerance which has already been described.

When we come to estimate the value of the Rasorian method, we find that it did not consist of the use of tartar emetic only, but that copious depletion was generally employed along with it, so copious, indeed, that no honorable and successful practitioner has since ventured to imitate its excesses. The doses advocated by Rasori were never generally adopted by other physicians, and by a few only in Italy, where Tommasini, in particular, inculcated a less heroic plan. He usually commenced the treatment with six or eight grains a day of tartar emetic, in divided doses, and rarely exceed fourteen grains

Diseases of the Chest, p. 345.

Cyclopædia of Pract. Med., iii. 440.

Dictionary of Pract. Med. (Am. ed.), ii. 894.

WATSON'S Lectures (Am. ed.), p. 513. On Diseases of the Chest, p. 280.

⁶ On Diseases of the Lungs, &c. (Am. ed.), p. 302.

⁷ Traité Pratique de la Pneumonie aux différens ages, &c. Paris, 1841.

in this period. Laennec employed a very analogous system. He prescribed one grain of the medicine every two hours, until six grains had been taken; and then, unless the symptoms were urgent, allowed the patient to repose for seven or eight hours. By gradually augmenting the dose, he sometimes reached the quantity of thirty grains in twenty-four hours. In this manner, and taking into the account well-marked cases only, he lost but about one patient in twenty. M. Louis, who investigated this subject with his wonted discrimination and impartiality, found that of twenty cases in which the disease presented a grave type, three only were fatal, and these were of persons between sixty and seventy years of age. M. Trousseau lost but two out of fifty-eight cases which he treated almost exclusively by antimonial preparations.

But the most conclusive facts which bear upon this subject consist of a group of cases, forty-four in number, which M. Grisolle treated by means of tartar emetic alone. They were all of a grave type. The treatment was commenced between the second and the ninth day of the disease. The initial daily dose of the medicine was from six to eight grains dissolved in five ounces of a simple infusion, and administered in portions every hour. The greater number of the patients did not take more than twenty grains in the course of the attack; some of them, however, took as much as sixty grains. All, without exception, experienced from it certain primary effects—vomiting and purging, namely; but the latter was the more frequent of the two. Out of sixty-six cases in which the medicine was continued for several days, tolerance was manifested in seventeen after the third or fourth day; and among one hundred and fifty-four patients who took the medicine in the manner described, twelve only tolerated it from the first.

Its influence upon the individual symptoms may thus be expressed. The first sign of its beneficial operation is the diminution or the cessation of the stitch in the side. Within twenty-four hours after the first dose the pulse falls considerably, and becomes softer, and at the same time the heat of skin abates. The fall of the pulse in the period mentioned varies between ten and forty beats a minute. The frequency of the respiration also declines, and most so when it has previously been most hurried. In seventeen of thirty-three cases the sputa, which were highly characteristic when the first doses of the medicine were taken, lost the greater part of their pneumonic characters within twenty-four hours, and in one-third of the cases had assumed the appearance of catarrhal sputa. In nearly all, the physical signs furnished by auscultation and percussion begin to diminish after the first day's use of the medicine. The other symptoms, such as headache, thirst, general malaise, &c., declined or ceased for the same period. As M. Trousseau has remarked, one effect of this treatment is that there is hardly any convalescence. Three days are sometimes sufficient to transport a patient from the very brink of the grave into such a state of well-being that, were it not for the auscultatory signs, the fact that he had labored under a dangerous attack of pneumonia would be incredible. M. Grisolle confirms this statement, and adds that he has

As regards the dose which may be given to children, Dr. West advises that for children two years old, one-eighth of a grain should be administered in solution every ten minutes until vomiting is produced, and continued every hour or two afterwards for a period of twenty-four or thirty-six hours. MM. Rilliet and Barthez give very similar directions.

Contraindications.—Many physicians have objected to the use of large doses of tartar emetic in pneumonia, that sometimes it occasions inflammation of the bowels. Both Laennec and M. Grisolle, however, found that redness of the tongue, abdominal pain increased by pressure, copious evacuations, &c., are mitigated rather than aggravated by continuing the medicine, provided that these symptoms have been produced by the action of the medicine itself. If they depend upon previous gastro-enteric inflammation, or if any degree of this state exists, the use of tartar emetic is wholly inadmissible. Hence, in the treatment of tuberculous pneumonia, the probability is so great of the bowels being already diseased, that the use of tartar emetic would be extremely hazardous.

Laennec held that when the medicine is not tolerated it ought to be abandoned; but since it is certain that its efficacy does not depend upon this condition any more than it does upon the evacuations which it may produce, a juster rule would be to persist in its use provided the local and general symptoms of the disease are improved by it. It should not be forgotten that complete toleration of the medicine from the first is unpropitious rather than encouraging, for it betrays a feeble

and imperfect power of reaction.

Dr. Peebles, of Petersburg, Va., has described injurious effects which he attributes to this medicine employed in the treatment of pneumonia. The chief symptom it seemed to produce was hemorrhage from the nostrils or from the bowels. Of the cases which he relates one only presented characteristic pneumonic symptoms, and in that one the "anxious and shrunken countenance, cold, harsh skin, and feeble pulse," did not certainly render tartar emetic a seasonable remedy. A tendency to hemorrhage is not one of the toxical effects of tartar emetic, at least in the white races, and in the cases referred to it must be attributed to a different-cause.

Attention has been called to another mischievous effect by Dr. Boling.³ It resembles somewhat the usual poisonous effects of the medicine, but is ascribed by Dr. Boling to the use of calomel along with the tartar emetic. While the improvement appears to be progressive under the treatment, "suddenly, in some cases, in others, somewhat gradually, the patient becomes restless, the thirst is augmented, the discharges from the bowels are more numerous and thin, the abdomen becomes tympanitic, and perhaps tender, the tolerance is lost, and though he may not have done so for several days, he vomits, or makes frequent efforts to do so; the tongue becomes dry and pointed; there is jactitation, anxiety of countenance, delirium, and perhaps stupor a short time before death. Occasionally jaundice

¹ Am. Journ. of Med. Sci., April, 1848, p. 338.

² Ibid., Oct. 1851, p. 330.

According to M. Trousseau, tartar emetic is very efficacious in arresting pulmonary hemorrhage when the source of the discharge is in the parenchyma of the lungs, and not in the bronchia. This distinction seems to be hypothetical. The use, however, of nauseants and emetics to counteract bleeding from the lungs is certainly to be approved. when rest, position, and revulsion fail to control it. They were long since recommended by Stoll. In pleurisy it was at one time a good deal employed, but a greater familiarity with the natural history of the disease has caused it to be abandoned. Chronic coughs depending upon bronchial inflammation have been cured by pustulating the chest with tartar emetic; but other and less painful methods are, at least, as It has been proposed to administer tartar emetic in acute phthisis, and for the cure of the intercurrent inflammations which complicate the chronic form of this disease. In spite of some plausible evidence of its utility, it must be presumed that the statements to that effect are erroneous.

Various writers, of more or less reputation, have reported the results of using large doses of this medicine in acute articular rheumatism. The names of Laennec, Chomel, Dance, and, in this country, Findlay, may be alluded to. The results of the first-mentioned authors are far from convincing, for they are sustained by no sufficient evidence. The essay of Dance, which is based upon an analysis of twenty cases, is wholly unfavorable to the remedy. With the exception of a few mild cases, none were permanently or beneficially influenced by it, while the disturbance of the stomach and bowels, and the distress occasioned by the movements it rendered necessary, proved it to be a very ineligible medicine. Chomel found no advantage from its use. The failure of tartar emetic in this disease, and its success in pneumonia, both of them affections which are regarded, but without sufficient reason, as involving the same pathological element, and therefore calling for the same treatment, illustrate the difficulty and the imprudence of deducing therapeutical precepts from pathological data.

Nauseating doses of tartar emetic have been found useful in a variety of local inflammations. During the forming stage of tonsillitis, such or even full emetic doses of the medicine will often cut short the attack. Mr. Lever (1837) and Dr. Kennedy found it a very certain means of arresting the development of mammary abscess after parturition. Other physicians have found it equally efficient in hernia humoralis, in acute ophthalmia, and even in parotitis. Recamier and Sanson allege that they have frequently succeeded in suspending the

progress of traumatic phlebitis by its use, in large doses.

Dropsy.—In those forms of the affection to which squill is appropriate, it has been observed that diuresis is more certainly established when tartar emetic is given at the same time. Such are the cases of dropsy which partake of an inflammatory nature, and which have arisen from exposure to cold after an exanthematous affection. If, in such cases, it is thought preferable to employ cathartics rather than

¹ Bull. de Thér., lix. 49.

Leçons de Clinique Médicale, p. 312.

N. Am. Med. and Surg. Jour., x. 167.

Archives Gén., iv. 481.

⁴ Archives Gén., xix. 485; xx. 5.

TROUSSEAU and PIDOUX, op. cit., ii. 740.

already been cited from Neumann, who adds, that it seemed to be of no advantage to the cough. The opinion once entertained of its efficacy may be inferred from the statement of Autenrieth, that it cured this disease in fewer days than other remedies would in weeks

disease in fewer days than other remedies would in weeks. In mania, nauseating doses of this medicine are sometimes used to control the violence of the paroxysms; in melancholia its emetic operation is occasionally productive of excellent results. But in puerperal mania, especially affecting persons of a dull phlegmatic temperament, it was highly recommended by Esquirol. Dr. Evory Kennedy says of it,1 "In several years' observation of this medicine's application in hospital and private practice, but two or three cases have held out against it when commenced sufficiently early." His plan was to prescribe nauseating doses, under the influence of which the patient was kept for twenty, or for thirty-six hours, or longer if necessary, taking care that depressing effects were not produced. Dr. K. admitted that its use requires great caution. The same author speaks highly of it as an adjuvant to venesection in puerperal convulsions, probably in the form depending upon serous plethora. Mr. Spence used it for maniacal attacks in females, especially when connected with disorders of the menstrual function, or occurring after delivery, and during the acute stage of the disease. He gave it according to the contro-stimulant method, in doses varying from five to thirty grains, and found that it seldom occasioned vomiting, but almost always great relaxation of the whole system with general quiescence, and a return to the rational and conscious state. It may serve to show how little the action of the remedy has sometimes been understood, to state that several writers have recommended it in delirium tremens, a disease which presents in the strongest light the frequently occurring combination of excitement with debility. Dr. Peddie, however, advocates its use in this affection, and has published several cases in proof of its virtues.3 It is possible that the emetic operation of the medicine may have been more serviceable than its sedative and debilitant action was injurious; for the usefulness of stimulant emetics in this affection is well established; but it cannot readily be admitted that a depressing agent like the one in question could be of real advantage. In mania-à-potu a condition distinguished by maniacal delirium, and the exertion often of prodigious strength, a fury which, indeed, usually subsides if left to itself, the remedy under notice may be used as a nauseant to control the patient's violence, or to hasten the resolution of the attack. The simultaneous employment of the warm bath with cold affusions upon the head is very serviceable.

To overcome Muscular Rigidity.—In the last century, a surgeon named Lebas, gained great credit among women for the art which he possessed of rendering the process of labor easy. According to Velpeau, he employed tartar emetic for this purpose. Ramsbotham recommended nauseating doses of antimony to overcome rigidity of the os uteri. In 1835, Dr. Evory Kennedy pointed out the conditions in

¹ Am. Jour. of Med. Sci., xvii. 305.

² Edinb. Med. and Surg. Jour., xxxvi. 112.

placement of the uterus, aneurism, valvular disease or dilatation of the heart, hæmoptysis, or congestion of the brain; during pregnancy

it should be very cautiously used, if at all.

Antidotes.—In poisoning by tartar emetic, it is recommended to give large draughts of lukewarm water, followed by infusions of vegetable astringents, such as cinchona, galls, green tea, &c. But the best authorities deny the efficacy of these astringent substances. Berthold recommends strong coffee as the best means of arresting excessive and protracted vomiting produced by this preparation. The Italian physicians generally prescribe wine, alcohol, ether, or opium, for the same purpose.

ADMINISTRATION AND DOSE.—This substance has an advantage over ipecacuanha in being tasteless, so that it can be administered to children, to the insane, to females, and to others who might refuse a nauseous or unpleasant medicine. To produce to lerance of tartar emetic, one grain in a small quantity of liquid may be given every two hours until six are taken, and then, after an interval of several hours, the dose may be gradually increased until from fifteen to thirty grains, if

necessary, are taken in the space of twenty-four hours.

To excite vomiting, one grain is the average dose. It is almost always given in solution. The most convenient plan is to dissolve three grains of the salt in a fluidounce of water, and administer one-half of this quantity; at the end of fifteen minutes half of the remainder, and in fifteen minutes more the rest. Draughts of warm water, or of some weak bitter infusion, may be given as soon as retching begins.

As a nauseant sudorific the dose is from a quarter to half a grain, given every hour or more. As a diaphoretic and expectorant, from one-twelfth to one-sixth of a grain, at intervals of one, two, or three hours. But for such doses antimonial wine is preferable. Of this preparation a fluidrachm (or seventy-two drops) contains one-quarter of a grain of tartar emetic.

If thought proper, tartar emetic can be associated with ipecacuanha, in the proportion of one grain of the former to ten or fifteen grains of the latter.

A solution of one grain of tartar emetic and an ounce of Epsom salts in eight ounces of water, and given in wineglassful doses every two or three hours, forms an excellent *purgative* in inflammatory affections.

The endermic application of this medicine by means of an ointment nas already been described. A saturated solution of the salt in water is considered preferable, as being "milder, less painful, and cleaner" than either the ointment, or the plaster made by sprinkling tartar emetic upon Burgundy pitch. It has also been proposed to produce a crop of pustules by inoculation. A paste is made with tartar emetic and a little water or oil, and, by means of a fine lancet, introduced into small punctures in the skin. The pustules which result are touched twice every day with a strong solution of the salt until they reach their maturity. Whenever tartar emetic ointment is applied to the integument in children, great care should be taken to prevent its being

Vinum Ipecacuanhæ.—Wine of Ipecacuanha.

This preparation is made by percolation from two ounces of finely powdered ipecacuanha in sherry wine so that two pints of filtered liquor shall be obtained.

HISTORY.—Ipecacuanha was made known in 1649 by Piso, who published an account of its singular efficacy in the dysentery of Brazil. In 1672, a large supply of it was brought from the latter country to France by a physician named Legros; but it was not until 1686 that it became generally known throughout Europe. Three or four years previously, Adrien Helvetius, after finishing his studies at Leyden, repaired to Paris for the purpose of selling certain nostrums of his father's composition. He failed in his adventure, but made acquaintance with a wealthy druggist, who at that time was under treatment for a serious illness by a physician named Afforty. When the patient got well he presented his physician with some of the Brazilian remedy as a mark of his gratitude; but Afforty, who appears not to have prized the gift very highly, transferred it to Helvetius. The latter made use of it in several cases of dysentery, and was convinced of its possessing specific virtues in this affection. The qualities of the new medicine, whose name, however, was kept secret, were speedily published at all the corners of the streets, and the court and the town echoed with its praises. Luckily for Helvetius, several courtiers, and the dauphin himself, the son of Louis XIV., were treated successfully by means of the new remedy. king, on learning from his minister, Colbert, how precious a secret Helvetius possessed, deputed his physician, d'Aquin, and his confessor, La Chaise, to ascertain its value, in order that it might be made public. After it had been subjected at Hôtel Dieu to trials, which all issued triumphantly, a thousand louis d'or were paid for the secret of its composition. Meanwhile, a certain Garnier, who had been employed to procure the root from Spain, set up a claim to share the reward upon the ground that the credit of introducing the medicine belonged to himself; but his plea was held to be invalid. Helvetius was afterwards decorated with titles, and raised to the highest medical dignities of France. He wrote a special treatise upon the use of ipecacuanha in diarrhœa and dysentery. It was not, however, until some years afterwards that its value was recognized in Germany by Leibnitz, Valentini, and Wedel, and in England by Sir Hans Sloane and by Baglivi.

Action. On Animals.—When ipecacuanha is administered in large doses to dogs it excites vomiting and is followed by depression. Impure emetia given to the same animals causes vomiting and depression, followed by sleep and sometimes by death. The mucous membrane of the stomach and bowels, and also of the bronchia, is found to be inflamed. Similar phenomena are occasioned by injecting a solution of emetia into the veins, the pleural or the peritoneal cavity, &c. Two grains of pure emetia are said to be sufficient to kill a dog. The

¹ Compare Murray, App. Medic., i. 797; Sprengel, Histoire de la Méd., v. 468; Biographie Universelle, xx. 23; Biographie Méd., v. 152.

² Orpila, Toxicologie, i. 651.

drug.¹ Previously to the attacks, which he describes, he had been in the habit of handling and using it without the slightest inconvenience. But once, while putting up a dose of the medicine, he was suddenly and violently attacked with asthma and oppression at the præcordia. He attributed the new susceptibility to weakness produced by fatigue. Two years afterwards a still more violent paroxysm was occasioned by a dose of the wine of ipecacuanha. It was attended with an intense burning sensation in the fauces and in the lungs. After the paroxysms of dyspnæa, and when expectoration became free again, a large quantity of sputa was rejected, "which any person at first sight would have pronounced to be a mass of small nearly transparent worms." These bodies were no doubt formed of concrete mucus moulded in the smaller air-tubes.

Effects of a different kind from any of these were observed in the case of a man who had been pounding ipecacuanha. Along with severe neuralgia in the branches of the fifth nerve, the eyelids were enormously swollen, there was profuse lachrymation, and injection of the conjunctiva; the cornea was turbid, the pupils contracted, and vision completely lost. These symptoms were more marked in the right eye than in the left. Foot-baths, a blister to the nape of the neck, and purgatives, with belladonna ointment around the eye, gradually dissipated the symptoms. On several other occasions the same cause produced similar effects in the subject of this case.³

Internally. In small or nauseating doses, ipecacuanha produces malaise, with shuddering, chilliness, yawning, a flow of saliva, and eructations. In somewhat larger doses it occasionally gives rise to uneasiness and rumbling in the bowels, and a sense of emptiness there, an increased secretion of saliva and mucus, constriction of the chest, irritation of the throat, a dry cough, occasionally spitting of blood or epistaxis, nausea, and an inclination to vomit. Very soon after it is taken in full doses it excites vomiting, which is neither very severe nor frequently repeated, nor attended with the same degree or even kind of sinking and prostration which tartar emetic occasions. In all doses it is apt to relax the bowels, if they are in a healthy state. It differs from the compounds of zinc and copper, in lacking their astringent quality.

The quantity requisite to produce an emetic operation cannot be definitely stated. In 1744-5, Dr. Samuel Pye published a list of nearly three hundred persons to whom he had administered ipecacuanha, together with its dose, and the effects produced by it. The average quantity which he gave was only two grains, yet it generally produced vomiting three or four times, and sometimes oftener. In about twenty of the cases it occasioned several stools besides. On the other hand, as will be shown under the head of Dysentery, sixty grains of the medicine have been given without any evacuation whatever following.

Cullen' taught that the powder "to the quantity of a grain, or perhaps less, in many persons can hardly be given without exciting nausea

^{&#}x27; Amer. Jour. of Med Sci., Jan. 1844, p. 252.

² Jour f. Pharmakodynamik, 1857, p. 397.

³ Med. Obs. and Inq. (4th ed.), i. 240.

Materia Med., ii. 475.

with acetate of ammonia or some other saline or alkaline draught. This medicine is one of the safest and most efficient in suffocative catarrh, and it can be used with confidence either in old age or infancy. A case is mentioned by Higginbottom of its complete success in removing the accumulated fluids from the lungs in a patient seventyeight years of age. Akenside states that he prevented suffocation from the mucus in the air-passages in variola by its use. M. Cruveilbier used the decoction or infusion (gr. cxx in Oiss of water) for the same purpose, or, as he more distinctly says, in capillary bronchitis. Of the quantity indicated, a glass was to be taken every half This method, he remarks, excites nausea and a flow of saliva rather than vomiting, and produces easy discharges from the bowels. Under its influence the cough subsides, expectoration becomes freer, and the patients feel relieved.2 In the suffocative catarrh of young children, and indeed in all the pulmonary affections of young patients which call for the use of emetics, ipecacuanha is the most efficient and safe. Very seldom, indeed, is the more powerful and perturbative action of tartar emetic requisite, and in general the milder agent should first be tried. In simple catarrhal laryngitis of the spasmodic form (spasmodic laryngitis) it will usually render unnecessary a recourse to the stronger medicine. In chronic bronchitis complicated with pulmonary emphysema it is very serviceable, both as an expectorant, and, during paroxysms of the disease, as an emetic. The accounts which have come down to us of its having cured consumption are doubtless to be understood as referring to chronic bronchitis with purulent expectoration. According to Delioux, it is but little inferior to tartar emetic in the treatment of pneumonia. He used it according to the Brazilian method, described below, and found that it not only did not occasion diarrhoea, but rather confined the bowels. It subdued the pulse, excited perspiration, deprived the sputa of their bloody hue, and hastened the resolution of the disease. It was prescribed conjointly with depletion and vesication. Pecholier, Cade, and Broussonnet have furnished analogous reports.4 The paroxysms of whooping-cough are sometimes rendered much milder by an occasional emetic of this substance. It was said by Akenside to be singularly efficacious in that form of spasmodic asthma to which hypochondriacal and hysterical subjects are liable, as well as females at their menstrual periods and at the menopause.5 This author expressly refers to its operation in relaxing the "contraction which has seized upon the bronchia, and the membranous cellulæ of the lungs, so as to hinder the ingress of air." A scruple may be given at once when the paroxysm is violent, or when the disease is habitual. From three to five grains may be taken every morning, or every other morning. Murray mentions several cases in which the medicine produced complete relief in this distressing affection. If the results of Pecholier's experiments upon rabbits might be invoked, they would tend to explain the efficacy of ipecacuanha in

Loc. sup. cit.; and Com. on Dysentery, p. 96.

¹ Trans. Lond. Coll. Phys., i. 102.

⁸ Annales de Thérap., v. 340.

Bull. de Thérap., xli. 152.

⁴ Bull. de Thér., l. 246; Br. and For. Med.-Chir. Rev, lxiv. 436.

in the first twenty-four hours. But the method of Piso was not closely followed by his successors, and the virtues of the remedy were less conspicuously displayed. Pringle, however, thought that it succeeded best when it operated by stool as well as vomited. He, indeed, laid it aside on account of the distress produced by its action; yet he adds, "Upon the whole, I am not clear whether it is not the surest method of cure." Cleghorn used the medicine after the same plan. Freind speaks of "that remarkable efficacy in dysenteric disorders which ipecacuanha challenges to itself." Among recent writers, Cambay insists upon its value after depletion. The number of citations might be multiplied; but, if narrowly examined, they make it evident's that not every form of the disease can be cured by this medicine, nor by every mode of exhibiting it. When the attack is brought on by cold, it is inferior to laxatives followed by simple opiates even at the onset; when by irritating ingesta, it has comparatively little advantage over other vegetable emetics or mild cathartics; but when the disease is epidemic, and assumes bilious characters, with bitterness of the mouth and a foul tongue, no remedy of the same class can be compared with ipecacuanha.

As was remarked above, when the treatment of dysentery by ipecacuanha was first introduced, large doses of it were given. In 1795, this practice was revived. Balmain, who had been in the habit of giving the medicine in small quantities, found that a nostrum monger in his neighborhood had been extremely successful in treating dysentery by doses of a drachm and a half to two drachms. He imitated this practice with great advantage, administering the medicine in the form of a bolus, along with forty drops of laudanum, and provided the patient kept quiet, and lay with his head and chest tolerably elevated, nausea seldom followed, and very often no stool occurred upon the. following day. A few years afterwards (1803-4), Mr. Playfair employed the same method in Calcutta. After trying small doses of ipecacuanha without effect, he prescribed from thirty to sixty grains with as many drops of laudanum. The first dose was sometimes vomited, but the second was always retained. Usually, for many hours after the medicine was taken, no inclination to stool was felt, and there was freedom from griping pain. When evacuations did at last occur, they were free, without pain, and unmixed with blood. Much more recently Delioux, who prescribed the medicine in large doses, but in decoction or infusion, and frequently repeated, found that after the vomiting and nausea occasioned by the first doses had subsided, tolerance was established; the abdominal pains were mitigated, the stools, though often more numerous the first day, were less so afterwards, and their characters were speedily modified, for they grew more bilious and consistent, and were even sometimes moulded; the pulse and heat of the skin subsided, and diaphoresis was established.

Diseases of the Army, p. 231.

On Fevers, p. 39.

⁵ Zimmermann, De la Dysentérie.

⁷ Edinb. Med. and Surg. Jour., ix. 18.

² Diseases of Minorca (Am. ed.), p. 146.

⁴ De la Dysentérie, p. 563.

⁶ Mem. Med. Soc. Lond., v. 210.

Bull. de Thérap., xli. 104 (1851).

ipecacuanha, has never yet failed in his hands, and that he has also found it successful in epistaxis. Cases of its success in hæmoptysis and menorrhagia, are given by Frank.' Vogt says that it is only in habitual and chronic losses of blood that the medicine is useful: but the cases already referred to disprove this assertion. M. Trousseau has several times used it with success in uterine hemorrhage, particularly after childbirth. He also found it to arrest an obstinate hæmoptysis in a female. The discharge of blood had continued, in spite of a variety of measures, for eighteen months, when ipecacuanha was administered, and the hemorrhage was suspended for three months. Mr. Higginbottom employed it with striking advantage in several cases of flooding after delivery, and when the exhaustion of the patient was such as to threaten speedy dissolution.²

M. Trousseau insists upon the great advantages to be derived from emetics of ipecacuanha in the various affections which are apt to occur after parturition, and all of which, according to him, have a peculiar character impressed upon them by the recent delivery. He particularly refers to acute dyspepsia, suppression of the lochia, subacute metritis, inflammation in the iliac fossæ, pulmonary catarrh and subacute pneumonia. It is very unusual, he asserts, for such disorders not to be removed, or at least greatly simplified, by the use of twenty or thirty grains of ipecacuanha in divided doses. Even when the disorders mentioned rise to the magnitude of serious inflammations, the symptoms are nearly always moderated by an emetic of this substance.

In intermittent fevers of a bilious type, and still more in the bilious and remittent fevers which prevail in the autumn, and sometimes in the spring, diseases in which there is generally a dusky hue of the complexion, some yellowness of the conjunctive, a loaded tongue, sick stomach, and fulness of the hypochondria, the administration of a full emetic dose of ipecacuanha at the onset of the disease, and even for two or more successive days, forms, perhaps, the surest method of moderating the violence and shortening the duration of the attack. It also prepares the way for a successful administration of the preparations of cinchona.

ADMINISTRATION.—As an emetic, the usual dose of ipecacuanha is twenty grains in powder. It is most efficient when given in divided doses of five or ten grains repeated every ten or fifteen minutes until vomiting takes place freely. As remarked above, however, much smaller doses than these produce emesis in many cases, and much larger may be given without danger. For infants the proper dose is one grain of the powdered root or one fluidrachm of the syrup. It is usual to administer tartar emetic and ipecacuanha in conjunction in the proportion of one grain of the former to ten or fifteen of the latter. As in the case of other emetics, warm chamomile tea, or warm water simply, should be given to promote the operation of the medicine. The infusion, which may also be used as an emetic, is made by adding 120 grains of the powder to six fluidounces of boiling water; it may be given in the dose of a fluidounce, and repeated at short intervals.

¹ Magazin. für Arzneim., i. 548, and ii. 768.

² Lancet, June, 1845, p. 732.

recent observers, although it may be suspected that his account is overcharged. According to him, in non-emetic doses repeated at short intervals, it augments the secretions of the liver and of the digestive organs generally, and as a consequence, where these are deficient, increases the appetite and promotes digestion. It also acts upon the mucous membrane of the air-passages, increasing or restraining its secretion according to its existing condition. It has also been known to excite the catamenial flow. In larger doses it strongly nauseates, lowers the pulse, and usually occasions "a quickly diffused and transient, and very peculiar nervous thrill, which pervades the whole system." In excessive quantities it sometimes excites vomiting, but more especially burning in the stomach, faintness, vertigo, diminished vision and general insensibility, coldness, extreme reduction of the force and frequency of the pulse, together with great irregularity of action and often palpitation of the heart, great prostration of muscular strength, and sometimes, though rarely, a convulsive rigidity of the limbs. These effects induced Dr. Tully to include sanguinaria, colchicum, and veratrum viride in the same group of medicines. powdered root acts as an irritant upon the Schneiderian membrane, upon ulcers and certain cutaneous eruptions, &c.

Uses.—The chief uses of sanguinaria cannot be better indicated than in the words of Dr. Tully defining deobstruent medicines. "By deobstruents," he remarks, "I intend such articles as produce a general change of condition or action in the whole secement and absorbent systems, and more especially remove torpor, and occasion improved and increased secretions from the liver and other digestive organs, and also from all the glandular viscera; and in all probability, by virtue of this operation, relieve certain dysthetic or cachectic diseases, and certain affections of the skin, and often likewise produce a direct resolution of many atonic, acute, subacute, and chronic inflammations . . . the whole independent of any direct change in the degree of the vital energies of the arterial system, or any material evacuation of any sort, as necessary accompaniments." These are terms such as are used to describe alterative medicines, and, indeed, the slow and gradual operation of bloodroot is of much more value than its emetic action, which is less certain and much more distressing than that of

ipecacuanha and other medicines of the same class.

The particular diseases in which sanguinaria has been used are too numerous to mention. Among them the following appear to have been most benefited. Chronic dyspepsia with diminished secretion of bile, sometimes jaundice, and accumulations of viscid mucus in the stomach and colon; but it is inferior as a remedy for this affection to mercurials in conjunction with saline cathartics and bitter tonics. It has been highly recommended in all forms of bronchitis, of a subacute or chronic type, accompanied or not with spasmodic cough, and particularly where the spasmodic element was highly developed, as in nervous asthma; but the association with it of opium or lobelia, recommended at the same time, destroys all confidence in the independent virtues of the first named medicine. A similar remark is applicable to its use in membranous croup; in this affection it pos-

CATHARTICS.

THE terms cathartic and purgative are derived, the one from the Greek *aθαιρω, and the other from the Latin purgo. Etymologically, they signify cleansing, and were, therefore, applied to medicines which were supposed to purify the system of its morbid humors, whether they produced a discharge from the bowels, the kidneys, the lungs, or any other part. By modern usage, their application is restricted to medi-

cines which are employed to evacuate the bowels.

Hippocrates appears to have considered purgatives, and, indeed, emetics also, chiefly as evacuants, and to have subordinated their use to his views of the indications for expelling morbid humors from the system; hence he enjoins that in acute diseases they should not be employed until the signs of coction manifest themselves, and then that they should not be used too vigorously. In another place he refers to the case of a man who died from the effects of a purge of elaterium, and while approving of the judicious use of cathartics under appropriate conditions, he points out the dangers incurred by those who use them without sufficient reason. Galen calls attention to the error of persons who congratulate themselves upon the copious operation of purges, forgetting, or not knowing, that it is usually followed by a confined state of the bowels. It is true that these precepts of the ancient physicians, which are reiterated by nearly all medical writers until within the last three or four centuries, had reference to drastic purgatives, which were then the only ones in use. The introduction of saline cathartics, and generally of laxatives, belongs to a comparatively later date, and is to be ascribed chiefly to the Arabian physicians. So much mischief appeared to have been done by drastic medicines in the hands of the vulgar and of ignorant or pretended physicians that Hoffmann wrote an essay on the propriety of rejecting them entirely from the materia medica.2 It is well known that the popular use of these remedies is quite as prevalent now as in the time of Hoffmann, and that, in spite of the fatal results of their injudicious use, and the trial and conviction of some of the more notorious quacksalvers for manslaughter by means of them, they continue to be regarded by the vulgar as the most efficient of all remedies. This partiality arises, in some degree, from the prejudice which the coarse and ignorant have in favor of whatever is vigorous or even rude in its action, but also, it must be confessed, from the unquestionable relief which cathartic medicines afford in many of the ailments of this class of persons, whom the habitual use of gross food, as well as the neglect of personal cleanliness and of the calls of nature, render peculiarly apt to be benefited by purgatives and depurative agents. The evacuant method, says Hufeland, has outlived all medical fashions

¹ Edit. Fœsii, i. 46, 406.

² Opera Omn., vi. 284.

the influence of mental states must not be overlooked. The most pressing desire to go to stool may be suspended by some sudden emotion; habitual and prolonged constipation may proceed from a dull and melancholy cast of thought, and, on the other hand, pain and fear may produce a sudden and profuse evacuation, owing to the rapid secretion of a large quantity of liquid into the intestines. The sudden application of cold to the abdomen, or even to the feet, will also produce an opening of the bowels, which, in this case, appears to be due rather to an impression upon the spinal cord and a reflex action upon the abdominal nerves, than to any action of the bowels themselves. That their distension may produce catharsis is evident from the effects of large draughts of pure water, especially if they are taken when the intestinal canal does not contain much fæces, and partly, also, from those of saline mineral waters, in which the proportion of the irritant

ingredient is very small indeed.

The primary action of purgative medicines is to irritate the mucous membrane of the intestine. The natural condition of food, in that it contains a large proportion of unassimilable constituents, seems to indicate that the latter are expressly provided for the purpose of stimulating the intestine by their mechanical impression. Food prepared in such a manner as to contain little or no unassimilable matter, soon exhausts the digestive powers, and, besides other evil effects, produces obstinate constipation. On the other hand, that which is largely composed of indigestible substances tends to increase the peristaltic action of the intestine, and the ease and frequency of the evacuations, and hence is often employed as a remedy for constipation in the shape of pulpy fruits, mush or bread made of Indian corn, wheat-bran, oatmeal, &c. Other varieties of food irritate the bowel and produce diarrhœa, not so much by a mechanical as a chemical irritation, for example, vegetable acids whether contained in the pulp of unripe fruits, or extracted from them artificially; crude vegetables imperfectly prepared for digestion by culinary processes; and saccharine substances which undergo partial fermentation, and become acid in the stomach. But even among the unassimilable principles of food, all are not equally mere irritants of the intestinal mucous membrane. Some are susceptible of absorption, and after having been taken into the blood, are eliminated, in a more or less altered condition, by the glandular structures, and chiefly by those of the kidneys and the bowel.

Cathartic medicines, like the unassimilable portions of the food, are partially retained in the intestine, where they exercise a stimulant or irritant local action, and are partially absorbed from the stomach and small intestines, and are excreted by the several organs, but particularly by the large intestine, where their stimulant action gives rise to an augmented secretion from its glandular structure in addition to that already provoked by the direct irritation of the medicine. All

This doctrine, for which a modern and indeed a quite recent origin is commonly assumed, is in reality the most ancient of any relating to this subject, for it dates back to the fourth century before the Christian era. Aristotle is thus quoted by Dr. Adams: "When purgatives are conveyed to the stomach, and are there dissolved, they are carried by the same passages as the food, and when they cannot be digested,

and partly on their local but indirect irritant action developed as they pass through the bloodvessels or the glands of the intestinal canal. By both operations the activity of the circulation in its mucous membrane, and cousequently in its secreting glands, is increased; a discharge of fluids takes place into the cavity of the intestine, mingling with and diluting its previous contents, while it stimulates the muscular coat to more active contraction, both by its own presence and that of the blood in the vessels, and by the increased bulk of the contents of the These contents consist partly of the indigestible or the undigested remains of the food and partly of the effete products of nutrition; for it must not be forgotten that the colon is the great reservoir in which the waste materials of the economy are deposited before being finally cast forth from the body. Now, it is probable that purgative medicines which are absorbed, and particularly those of the saline and resinous groups, are excreted by the same channels through which the ordinary secretions into the colon take place, and, as was just remarked, they cannot during their passage fail to stimulate the intestinal glands, and consequently to hasten the elimination of effete matters from the blood, as well as whatever specific material causes of disease may there exist, and also to quicken those destructive changes in the tissues which, within due limits, are absolutely essential to the preservation or the restoration of health.

The universality of the treatment by purgatives is explained by this view of their operation. There is hardly any disease, whether acute or chronic, in which the process of nutrition is not disordered, and in which the normal secretions, and therefore the due elimination of the products of the destructive processes of nutrition, are not interfered with. There are also some in which certain alvine evacuations proper to the disease suggest or represent the natural process of its cure, and which it is, on the one hand, hazardous to interfere with, but generally most salutary to promote, if care be taken to prevent their running

into excess.

The evacuations produced by purgatives vary with the different agents employed, both in regard to their quantity, consistence, and composition. Their quantity depends, at least in the first instance, upon the amount of food and fæces which may happen to be present in the intestinal canal. The first discharges are usually fæcal, and the subsequent ones are less consistent and more or less mixed with partially digested food. These are followed by the mucous and biliary fluids in various proportions. The more or less prolonged sojourn of the fæces in the bowel, as well as the state of its glandular, and especially of its biliary, secretion, render their color various, from the paleness of clay to an almost inky blackness, with intermediate shades of yellow, brown, and green, the last almost exclusively in infants. But yellowish stools, which are sometimes supposed to be bilious, may derive their color from rhubarb or gamboge used as a purge. Among the laxatives, the salines, appropriately dissolved, produce copious and watery evacuations, with more or less borborygmi and griping, and sometimes a scalding sensation in the anus. Magnesia is very apt to be partially evacuated in substance, as shown by whitish

The evacuant operation of purgative medicines, it will be remembered, is not confined to the removal of the contents of the bowels, but promotes the depuration of the blood besides; and thus, by a double action, tends to remove from the system the causes of disease, as well those which might enter from the intestinal canal as those which are generated by the decomposition of the tissues, or have been received from without, either through the lungs or the bowels. these may be added another, and in some cases a very important, mode of action, that of promoting absorption from the intestine. Purgatives here act partly by removing the accumulated secretions which impede the absorption of the nutritive juices. These "sordes" of the ancients are not of questionable existence, as in the case of the stomach, for they have often been demonstrated by the inspection of dead bodies, especially of those which were also found to contain intestinal worms. Their action must necessarily be to interfere with the influence of the digestive juices upon the food, and still more to obstruct its absorption by the lacteals. Now, purgatives remove this obstacle to nutrition, while they directly quicken the function by their stimulant impression.

The depletory action of purgatives is that which renders them applicaple to the cure of so large a number of diseases; to nearly all, indeed, which involve an inflammatory or a congestive element. addition to the constitution of the blood, so far as it contains morbid elements, and which was noticed in the last paragraph, it must not be overlooked that the mere bulk of the circulating fluid is often a serious aggravation of disease, and that much suffering and much imperfect performance of function may be prevented by reducing the tension of the bloodvessels. A more direct manner of accomplishing the same object is venesection. This important agent, which a medical fashion has caused to be temporarily laid aside, is closely imitated in its operation by cathartics, and especially by those of the saline and the drastic groups. But while venesection removes all the elements of the blood alike, purgatives abstract only its watery portion, and hence the latter must be considered as only supplementary to the former, or as an appropriate substitute for it whenever the treatment is intended to be sedative rather than spoliative. The element withdrawn from the body by venesection is vital, and has required a long elaboration to perfect, and its loss is one which the system is slow to repair; but that which purgatives remove is little else than water, and it is replaced speedily and without difficulty. In some diseases, as in serous plethors and dropsy, direct depletion is inadmissible; but indirect depletion by purgatives which produce copious watery stools will carry off the excess of fluid, and allow an opportunity for a radical cure by other means. They accomplish this object indirectly, by depriving the blood of a portion of its watery constituent, and thus enabling the veins to take up the fluid which is effused in the cellular tissue or elsewhere.

Several classifications of purgative medicines have been employed. The most ancient was founded upon an observation of the quality of the discharges which they provoked. There were eccoprotics, or medicines which promote the expulsion of fæces without agumenting the intestinal secretions in a marked degree. Among these none can be

bile. It seems probable that what is usually called torpor of the liver is oftener torpor of the stomach and duodenum, and hence that to attempt its cure by addressing remedies to the liver itself is to apply them to the wrong end of the chain of morbid causes.

The list given above of medicines which the ancients held to be cholagogue shows conclusively that they included in this division of purgatives all which, in appropriate doses, are capable of exerting a lively impression upon the intestinal canal, and particularly of exciting serous discharges, and thereby "unloading" the portal vessels, and indeed the circulation of all the chylopoietic viscera. Such an operation must necessarily have for an effect the quickening of the intestinal and the pancreatic as well as the hepatic secretions, and more remotely the better performance of the digestive function. Among them there are two-aloes and rhubarb-which contain bitter principles, and which are probably in a peculiar sense cholagogue, because by virtue of this element they may possibly to some extent act as the bile itself does, and consequently promote changes in the food adapted to solicit the secretion of the liver. At the same time it must be admitted that the yellow color of the dejections which they provoke lent some plausibility to, if it did not indeed suggest, the idea that they promote a discharge of bile.

But it is certain that mercurial medicines are not cholagogue by virtue of their stimulant or irritant action upon the intestinal mucous membrane, and consequently that if they excite the biliary secretion. it is because they are absorbed, and that they either stimulate the liver in consequence of a specific direction to that organ, or that by modifying the condition of the blood they promote its secretion in common with that of all the other glands. The latter is almost certainly their real mode of operation, and one that is often displayed by alkaline medicines, which have also been classed as cholagogues. The proofs of this mode of action, particularly in the case of mercury, will be found in another part of this work; but we think enough has here been said to render it highly probable that there are no such medicines as cholagogues in the sense of their having a specific power of stimulating the secretion of the liver alone.

An arrangement founded upon the mode of action of medicines belonging to the present class, and which is most in accordance with the existing state of knowledge, is that proposed by Mialhe, who, if he does not always satisfy the judgment by demonstrating a coincidence of his conclusions with those of clinical observation, has, nevertheless, we are persuaded, adopted the only method of investigation which can lead to accurate results, either in theory or practice. All cathartics, which are not merely mechanical irritants, are either soluble or insoluble. The former either possess a coagulating influence, enabling them to combine with the tissues, irritating them and augmenting their secretion, as in the case of croton oil; or else are destitute of that coagulating power, but either by endosmosis, as in the case of the salines, or by a peculiar power of stimulating the

¹ Chimie Appliquée à la Physiologie et à la Therapeutique, Paris, 1856.

stimulating quality, there is usually more or less gastric derangement, nausea, and oppression, a bitter or pasty condition of the mouth, and loss of appetite; the abdomen is distended and hard, and is the seat of uneasy sensations, including fulness and more or less colic, a sense of pressure about the anus, often enlargement of the hæmorrhoidal veins, with general malaise, some headache, muddiness of the complexion, feverishness, and turbid urine. Under these circumstances, three or four grains of blue mass followed by a dose of the infusion of senna with Epsom salts; or else the compound extract of colocynth with a small proportion of calomel or blue mass, will cleanse the bowels effectually of their offending contents, and dissipate all the symptoms to which their presence gave rise. This form of indisposition is probably due either to the excitability of the bowels having been exhausted by the undue quantity or the quality of their contents, or by the accidental influence of mental causes of an exciting nature, and if not thus treated is apt to work its own cure by a spontaneous diarrhæa, provided that a proper abstinence from food is observed.

Habitual constipation may proceed from a variety of causes, some of which reside within the intestine itself, while others are external to it. It is probably in the colon, the organ of defecation, that the greater number of the former exert their influence. They may consist of a deficiency of the natural secretions, which, while they give the fæces a proper consistence, either stimulate the bowel to a due degree of peristaltic action, or mechanically promote the progress of its contents by lubricating the mucous membrane of the colon and rectum. fæcal mass, if retarded in its passage, gradually loses its moisture by absorption, and enlarges by the accretions which it receives from above, until it finally distends the bowel, overstrains and paralyzes its muscular coat, and thus leaves no means of relief except from purgative medicines. For such a condition, those which correct its causes are the most appropriate; laxafives which soften the obstructing mass, and purgatives which promote its expulsion, such as salines with resinous cathartics, aloes and colocynth with Epsom salts, for example. The most ordinary causes of this form of constipation are want of muscular exercise, and with it an undue or a painful application of the mind, or any other cause which, while it tends to diminish the intestinal secretions, leads to a neglect of the calls of nature. The universal habit of taking the meals at regular hours involves the necessity of an equally regular and periodical evacuation of the bowels, for in all healthy persons very nearly the same number of hours must be required for the digestion of the food, and the arrival of the feecal mass in the rectum where it excites a desire for and a tendency to its evacuation. If the call of nature, as it is most aptly termed, is not obeyed, the rectum gradually loses its sensibility to the stimulus, and an accumulation takes place in it of fæcal matters which sometimes attain an enormous size, filling the entire cavity of the pelvis, and gradually becoming so dry and hard that no means except mechanical ones can any longer avail to dislodge the mass.

Closely allied to the form of constipation just noticed is one which is frequently associated with it, and which is generally ascribed to

little regard is paid to their secondary effects; too much inclination is shown to depend upon them instead of adopting the slower but more certain method of cure by means of a regulated diet and exercise, and of tonic medicines adapted to restore the bowels to their normal strength. A mere purgative operation calls upon the intestinal muscles to make a powerful exertion; they become exhausted by this expenditure of strength, and speedily fall into a state of atony more complete than that from which they had been aroused. Hence the mischiefs of habitual purgation. Even if continued and increased torpor of the bowels were the only evil, it might be borne. But the constant use of purgatives irritates the stomach, impairs the appetite, occasions flatulence and dyspepsia, and may possibly become a cause of chronic thickening, hæmorrhoids, or abscess of the rectum, &c. Especially are they to be used moderately, or avoided, if possible, when the patient is of a nervous and susceptible temperament. such cases comparatively small doses of these medicines will be found requisite, while in persons of a torpid nature, with thick skin, heavy features, and an impassible nervous system, the stronger and more depletory agents are to be preferred. But whenever the debility which may exist, with its accompanying symptoms, depends upon confinement of the bowels, they should be released by whatever degree of active treatment is necessary for the purpose, it being always borne in mind that in such cases clysters should precede purgatives, as being less exhausting, and more speedy in their action.

Biliary disorders without so much derangement of the digestion as of discomfort in the right hypochondrium, enlargement of the liver, and jaundice, are most effectually relieved by purgatives, preceded, according to a custom which rests upon theoretical rather than practical grounds, by small doses of mercury, and especially of blue mass. Saline medicines are usually to be preferred, particularly if administered in a very diluted form. On this account natural saline mineral

waters are peculiarly efficient.

Diarrhæa is a symptom of various pathological conditions, from the slightest to the gravest, from the most transient irritation or congestion to a destructive ulceration of the mucous membrane of the intes-It may be caused by all ingesta irritating by nature or rendered so by the existing morbid susceptibility of the bowel; by a profuse secretion of bile, such as is apt to occur during the hot season of the year, or from errors of diet, and particularly the exclusive use of either vegetable or animal food; by secretions from the mucous glands containing some morbid element such as that derived from the repercussion of certain cutaneous diseases and the effluvia of putrefying organic matter; or by the stimulus of over-distension when the body is weakened, as in cholera. It may also be caused by morbid conditions of the mucous membrane itself, including congestion or inflammation arising from the action of cold upon the surface of the body, ulceration of the glands from the deposit of typhoid or tuberculous matter in them, or by a debility generally attended with atrophy of the mucous membrane. Finally, diarrhoea may be excited by irritation in a remote part, as in the nerves of the teeth during dentition,

ing purgatives in the treatment of continued fever, but in general without distinguishing between typhus and typhoid fevers. Among those, however, who, like Huxham, did recognize the radical differences of these two affections, mild purgatives and laxatives were prescribed in the former, but condemned in the treatment of the latter. known," says this writer, "a common purge injudiciously given at the beginning of this fever immediately followed by surprising languors, syncope, and a large train of other ill symptoms; however it may be necessary sometimes, even at the beginning to cleanse the primæ viæ by a gentle puke, a little rhubarb, manna, &c., if you give anything drastic, be assured your patient will rue for it, and you will repent it." More modern observations have shown that a systematic treatment of typhoid fever by laxatives is attended with a less mortality than when depletion, stimulants, or tonics, are chiefly depended upon, and over these methods it has the advantage of shortening the disease, and preventing, in a great degree, such complications as bed sores, hemorrhage, and perforation of the bowel. Yet when compared with an expectant treatment, in which particular symptoms are combated as they arise, while the general management of the disease is committed to hygienic influences, there is nothing to manifest the superiority of evacuant measures. Indeed, typhoid fever would constitute an exception to all self-limited diseases if any treatment whatever were competent materially to shorten its duration or diminish the mortality which belongs to it under a mild expectant system. however, medicinal alvine evacuations are thought desirable in any case, they should be procured by means of castor oil or saline laxatives, which are usually recommended (apparently upon theoretical grounds, if not under the influence of a mere habit acquired during the sway of a medical hypothesis) to be prescribed in conjunction with small, or so-called alterative, doses of blue pill or calomel.

One of the most valuable applications of purgatives is to the treatment of serous plethora, a sort of dropsy of the bloodvessels, which is very common during pregnancy and in chlorosis. It is this condition which has led to the custom, at one time universal, and still common among the vulgar, of considering bleeding one of the necessary incidents of the pregnant state; but while depletion relieves the plethoric condition, it robs the blood of its most important element, the red corpuscles, and predisposes to a renewal of the symptoms in a more aggravated degree. An equal alleviation is procured by saline laxatives, particularly when they are associated with diuretics of the same class, without any loss of strength. Similar remarks are applicable to the serous plethora of chlorosis. Evacuant, tonic, and ferruginous medicines, in due proportion, are often essential to the successful management of this disease.

The evacuant operation of cathartics has always rendered them the principal agents used in the treatment of dropsy, and serous effusions generally. The liquid which they cause to be discharged from the intestinal canal is speedily replaced by that which is absorbed from

An Essay on Fevers, 7th ed., p. 81.

indication presented; in the other those which especially stimulate the lower part of the bowels—the resinous cathartics in general, and

aloes in particular.

Affections of the respiratory organs are not in general favorably influenced by cathartics, except in so far as a state of plethora may be present, or when the disease is in its forming stage. In the former condition their depletory action is important as a palliative, and in the latter it sometimes prevents any further development of the attack. Saline cathartics are only to be preferred in such cases when there is a decided febrile reaction; but for bringing about resolution, promoting expectoration, and allaying the painful irritation of acute inflammations of the bronchial mucous membrane, no remedy is comparable to castor oil.

The use of purgatives in chorea is not of recent introduction into medicine, since it was recommended by Sydenham and De Haen, and more lately by Hamilton and Bardsley. In cases of pure and uncomplicated chorea occurring in robust children, it is very probable that medicines of this class will often accomplish a cure, but in many others, and, as we believe, in a majority of the whole, a really curative plan must be tonic rather than debilitant. But it is a peculiarity of this disease that the bowels are very torpid, and the dejections are often very dark and fetid; and it is probable that this circumstance first suggested the employment of cathartics for its cure. Those which have been most successfully employed belong to the drastic division, and comprise calomel and jalap, scammony and aloes, and should be given at intervals of two or three days according to the nature of the evacuations and the degree of improvement obtained.

Several diseases of the skin are benefited by a judicious and persevering use of purgatives. Eczema and impetigo, at the decline of the acute stage, are sensibly moderated by saline laxatives, particularly when administered in conjunction with bitter vegetable infusions; and lepra, if not inveterate, is improved by these and by the more

drastic articles, such as jalap and aloes.

In general terms, the selection of a purgative should be determined by the character of the effect which it is intended to produce. The salines are adapted to a prompt and thorough evacuation of the bowels, with the advantage of acting as depletory agents. Croton oil is also speedy in its operation, and is at the same time powerfully revulsive. On the other hand, a slower but equally decided influence is exerted by the resinous cathartics and by castor oil, either alone or given subsequently to the administration of calomel. When acidity of the stomach and bowels prevails, magnesia is preferable to all the other agents of its class. If the biliary secretion is deficient, mercurials are supposed to render it more abundant, and if, on the other hand, it is excessive and altered in quality, the same medicines, by increasing its flow and at the same time tending to evacuate it from the bowels, are still regarded as the most appropriate remedy.

The association of different purgatives in the same dose is an ancient practice, and was intended to promote, by a single medicine,

purpose; but it is too apt to interfere with the cathartic operation. When calomel is given in cases attended with large or frequent evacuations, this combination is of great value. Purgatives which gripe because they create flatulence, may have their action favorably modified by associating with them a carminative, as anise or caraway seed; and the irritation of drastic medicines may be moderated by the free administration of diluent and especially of mucilaginous drinks, after this symptom has begun to manifest itself. The same liquids are very serviceable in allaying the gastric and intestinal irritation produced by the harsher purgatives. Bitter tonics are often associated with cathartic medicines, particularly when a necessity exists for their repeated use, and when the former agents are not contraindicated by the presence of a febrile or inflammatory state. In the treatment of habitual constipation, this combination, while augmenting the power of the cathartic medicine, prevents it from rapidly exhausting the susceptibility of the bowel, and requiring a repetition of the purgative dose.

CATHARTIC ENEMATA.—An operation of the bowels can be produced by any of the agents of the present class, introduced into the large intestine through the anus. As in the case of the same medicines administered by the mouth, they may operate by their bulk, their temperature, or their intrinsic stimulant or irritant properties, and in some degree also in consequence of their absorption. According to the experiments of Falck, the more the temperature of a clyster of pure water is above or below that of the body, and the greater its bulk, the more apt it is to produce a purgative effect. To fill the colon of an adult, three or four pints of liquid are necessary, and there is reason to believe that a portion of it may pass through the ileo-cæcal valve. This is not, however, ordinarily the case, and hence this valve used to be called by the French la barrière des apothicaires, or the apothecaries' barrier, in allusion to the custom of employing apothecaries to administer enemata. The habitual use of such large enemata is accused, and probably with justice, of producing permanent dilatation as well as atony of the colon. But there can be no objection to using them occasionally.

The advantages of evacuant enemata over purgatives by the mouth are several, but they are chiefly confined to cases in which it is desirable to avoid irritating the stomach or interfering with digestion, and those in which the object in view is either to evacuate the lower bowels, or to employ their mucous membrane as a surface upon which a salutary derivation may be made. All medicines of the purgative class, except calomel, may be made use of in this manner, and consequently all degrees of stimulation may be applied to the colon by their means. The same laws respecting the absorption of medicinal substances obtain in this as in the other case, and consequently the effects of enemata depend in part upon their local irritation, and in part upon their absorption and subsequent elimination from the glands and bloodvessels of the colon.

^{&#}x27; Archiv. für phys Heilkunde, x. 765.

bark, a decoction of rice, or barley, or oats; or, if a stimulant operation is required, it may be procured by means of oil of turpentine or assafetida, the former made into an emulsion with mucilage or the yelk

of egg, and the latter with mucilage or water.

It is of the utmost consequence to the success of enemata that they should be administered slowly, and with occasional remissions of the propulsive force, so as to allow the liquid to diffuse itself over the large intestine. This is peculiarly necessary when the bowel is obstructed with fæces. The patient should lie upon the left side at the commencement of the injection, afterwards upon the back, and ultimately upon the right side, so that gravity may favor the diffusion of the liquid throughout the large intestine. The first tendency to expel it should be steadfastly resisted, and the patient's effort to do so seconded by applying a folded napkin, and pressing it firmly against the anus.

Purgative suppositories were employed by Hippocrates, composed of honey, soap, salt, nitre, and powdered colocynth. Although these agents were generally applied in the vagina for the cure of uterine affections, they were also, as in modern times, sometimes introduced into the rectum, and directed to be of a spherical and sometimes of an oblong or oval shape. They act partly by mechanical irritation, and partly by their purgative virtues. Dr. Osborne found assafcetida, elaterium, and croton oil, associated with soap, to act freely when employed in this manner; but croton oil, on account of its extremely irritant properties, should not be used except when the necessity of procuring an evacuation of the bowels is unusually urgent. A very efficient laxative suppository, and one much used by nurses and the poorer classes when constipation affects infants, consists of a piece of brown soap about an inch in length and half an inch in diameter. But its repeated use irritates the anus, and renders the constipation more obstinate. In all cases the suppository should be introduced beyond the grasp of the sphincter ani. It may be carried to its place by means of the finger, previously anointed, or by means of a glass or vulcanized India rubber tube, open at both ends, and furnished with a piston.

SULPHUR LOTUM.—WASHED SULPHUR.

SULPHUR SUBLIMATUM.—SUBLIMED SULPHUR.

DESCRIPTION.—Sulphur is a simple substance which is very widely diffused in nature. It exists in a more or less pure state, or combined with metals, in the mineral kingdom, and enters into the composition of albuminous or protein substances. It is most abundant in volcanic regions. The crude sulphur of commerce is chiefly obtained by fusing native sulphur or by roasting native sulphurets. By heating this product sublimed sulphur is obtained, which, when thoroughly

¹ Ed. Fæsii, i. 265.

secretion of intestinal mucus and procure abundant and semi-fluid dejections, but do not destroy the appetite. Very large doses are said to cause inflammation of the gastro-intestinal mucous membrane, which, however, is superficial and unattended with any violent symptoms.

A nine years old horse, of medium strength, and affected with the glanders, had given him an ounce of sulphur the first day, two ounces the second, &c., so that by the sixteenth day he had taken one hundred and thirty-six ounces. Diarrhea set in upon the seventh and continued until the seventeenth day; the appetite was not diminished, nor the secretion of urine changed; the cutaneous secretion was not augmented, but after the third day had a sulphurous smell, and, by blackening a paper wet with a solution of sugar of lead, was proved to contain sulphur. The other symptoms which the animal manifested might very well have arisen from the disease under which he labored. On the seventeenth day he was killed. The mucous membrane of the stomach and bowels was reddened and softened, and their cavity contained a large quantity of sulphur. The flesh of sheep that had had sulphur mixed with their food was found to taste and smell so strongly

of sulphuretted gas as to be unfit for the table.

On Man.—When applied without friction to the sound skin it exerts no sensible action, but when excoriations or ulcers exist, or the chorion is already inflamed, sulphur acts as a mild irritant. Internally, in doses of five or six grains, it produces no sensible phenomena, but when twenty grains, or from that to forty grains are taken, it creates some movement in the abdomen, and a loose discharge from the bowels, without colic. At the same time whatever flatus escapes has the characteristic odor of sulphuretted hydrogen. But the greater part of the sulphur is passed unchanged. When doses of twelve grains or more are repeated at intervals of an hour or two, their action is said to be displayed by a higher temperature of the skin, and by increased perspiration and frequency of the pulse.1 The skin exhales a sulphurous smell, and silver articles allowed to remain in contact with it, are blackened. It has happened, when a course of mercury has followed the administration of sulphur, that parts of the skin have turned black from the formation of sulphuret of mercury.2 The expired air, the urine, and the milk, have also revealed its presence by their odor, or by the use of chemical reagents. Vogt observed that when taken for a long time, it gives a peculiar tint to the skin, and Hahnemann noticed brownish spots and other ephemeral cutaneous eruptions from its use.3 · If, according to Mitscherlich,4 the patient is plethoric and impressionable, or is suffering under an inflammatory disease, sulphur is apt to cause excitement of the circulation, and The stools, in general, are semi-liquid, a circumstance feverishness. peculiar to the laxative operation of sulphur. In some cases the medicine occasions a sense of extreme anxiety and depression, which ceases upon the free discharge of fetid gas from the bowels, and is therefore thought to depend upon the action of sulphuretted hydrogen.

BARBIER, Mat. Med., ii. 244.

of potash, and eight of lard. M. Hardy afterwards perfected the method so as radically to cure the disease in two hours. He proceeded in the following manner: The patient first underwent a friction of his whole body for half an hour with soft soap, in order to cleanse the skin and break up the burrows; a warm bath of an hour's duration followed, during which the skin was thoroughly rubbed in order to complete the destruction of the burrows; after which frictions for half an hour, and upon the whole surface, were practised with Helmerich's ointment. This completed the cure. Out of four hundred patients subjected to this treatment four only returned to the hospital.* It is probable that such thorough frictions, applied only to certain parts of the body, as Hebra recommends, would prove quite as effectual and be much less By the method of Dr. Bourguignon, a Belgian physician, the same result is claimed to have been produced in half an hour. He made use of a liquid prepared by boiling one part of quicklime with two parts of sublimed sulphur in ten parts of water, until the two former were perfectly united. During the boiling it was constantly stirred with a wooden rod, and when the sulphur and lime had combined the fluid was decanted and kept in a well-stoppered bottle. A pint is enough for the cure of several cases. It is sufficient to wash the skin well with warm water and then to rub the liquid into it for half an hour. As it evaporates a layer of sulphur is left upon the skin. During the half hour the acarus is killed, and the patient is cured.3

Sulphurous fumigations were long ago employed by Glauber and by J. P. Frank, who may perhaps have had the plan suggested by a custom which prevails among the inhabitants of the Solfaterra in Italy, of employing the sulphurous vapor which there issues from the earth for the cure of various diseases. More recently, Galés in Paris, Clarke, Wallace, and Bardsley' in England, and Dr. Emerson in Philadelphia,' made use of a similar method. The forms of disease in which it was employed are chronic eczema, psoriasis, impetigo, and prurigo, rheumatic and scrofulous affections, paralysis, amenorrhæa, &c. In many instances the plan was successful, but the accidents which it sometimes occasioned probably led to its neglect. These are, according to Rayer,' irritation of the skin, great debility, syncope, suffocation, &c., effects which would render the method dangerous if indiscriminately used.

Sulphur baths, particularly those of natural thermal springs, are much safer, as well as more efficacious. In Europe these springs are numerous; they do not, it is believed, exist in the United States. With intelligent management, however, the cold sulphur waters of Virginia and New York might be rendered more useful than they now are in cutaneous and rheumatic affections, &c. The action of warm sulphur baths is thus described by Rayer.' After using them

<sup>Bull. de Thérap., xxxix. 137.
Association Med. Jour. and Phil. Med. Exam., July, 1856, p. 447.</sup>

⁴ Hospital Facts and Observations, p. 192.
⁵ Phil. Jour. of Med. and Phys. Sci., iii. 126.

⁶ Mal. de la Peau (éd. de Brux.), p. 38. ⁷ Ibid., p. 87.

MAGNESIA. — MAGNESIA.

DESCRIPTION.—Magnesia combined with various acids exists in the mineral and vegetable kingdoms, and as a product of urinary disease in man. It is prepared from carbonate of magnesia by calcination. It is usually a light, fine, white, and inodorous powder with a faint earthy or alkaline taste. By some methods of preparation it acquires a density four times as great as that of ordinary calcined magnesia. It is almost insoluble in water, but is less so in cold than in hot water. It was thought to be insusceptible of fusion until it was melted by the compound blowpipe of Dr. Hare. When stirred with water and then allowed to stand, it becomes hard by a partial conversion into a hydrate.

HISTORY.—Our acquaintance with magnesia is not of earlier date than the commencement of the eighteenth century, when it was vaunted as a panacea under the name of Count Palma's powder. its introduction into the materia medica we are indebted to Lancisi in 1717, and to Hoffmann in 1722. The latter states that its reputation while a secret remedy was gained by the relief it afforded hypochondriacal persons, and those who suffered from acidity of the prime viæ.1 In 1773 Mr. Henry recommended the calcination of magnesia as rendering it a fitter medicine in certain cases; and the preparation was soon afterwards introduced into the British Pharmacopæias, under the name of magnesia usta.

ACTION.—The action of magnesia upon the bowels is more or less distinct according to the quantity of acid which they contain, by means of which it is converted into a neutral and purgative salt. Hence its operation is generally quickened by acidulous drinks such as lemonade. By absorbing the acids which it encounters in the stomach and intestine, it prevents the consequences of their local irritation as well as their return into the system. When enough acid is not contained in the alimentary canal to combine with all of the magnesia taken, a portion of the latter is apt to be retained. Hence it has happened that when magnesia has been used daily or at short intervals for a long time, it has formed considerable masses by its union with the intestinal mucus and indigestible articles of food, and quite obstructed the passage of the bowel. Two such cases are quoted in many treatises upon the materia medica, in one of which not less than nine or ten pounds of magnesia had been taken in the course of two years and a half; but the fact that these instances appear to be almost the only ones upon record shows that the mischievous effect alluded to must be extremely rare. Magnesia is capable of destroying the acidity of the urine when taken for some time, and may even reverse its quality and cause a deposit of the earthy phosphates in the form of white sand.

Uses.—Magnesia has an advantage over nearly every other laxative, in being almost insipid and rarely causing sickness at the sto-

Op. Omnia, iv. 479; Animadversiones et Experimenta circa Magnesiam albam, &c.

peared to act as an antidote to arsenical poisoning, but, as observed by Orfila,1 the cases are not conclusive; because in all of them vomiting took place after the magnesia was administered, and consequently a large portion of the poison may have been rejected. In experiments on animals it was found by this toxicologist, that when magnesia was given along with, or directly after, arsenic, death was nevertheless the result if vomiting was prevented by ligature of the esophagus. sides, arsenite of magnesia is itself poisonous, although less so than arsenious acid. Schroff remarks, that magnesia acts as an antidote to arsenic or arsenious acid only when the latter is not introduced into the stomach in solution, for the soluble preparations of arsenic are too rapidly absorbed to be arrested by any chemical antidote.2 Magnesia may be used as an antidote to poisoning by acids and by phosphorus. In the latter case, calcined magnesia suspended in boiled water, and freely administered, is recommended by Antonielli and Borsarelli, as the best antidote, and the most appropriate purgative for eliminating the poison.

Cases of diabetes mellitus cured by magnesia have been published from time to time. Eberle found it successful in a mild case of long

standing.

ADMINISTRATION.—The purgative dose of magnesia is about forty grains for adults, and five grains for infants. As an antacid, it may be taken in doses of ten grains and upwards twice a day. It may be given in water or milk.

MAGNESIÆ CARBONAS.—CARBONATE OF MAGNESIA.

DESCRIPTION.—This substance is prepared by decomposing sulphate of magnesia with carbonate of potassa. Its physical properties are almost identical with those of magnesia. It is, however, even less soluble than that substance in water. Its uses are the same as those of calcined magnesia, but it is less active. When sickness at the stomach is present, the carbonate is, perhaps, to be preferred in consequence of its evolving carbonic acid, but in general this quality is a defect, inasmuch as it is apt to cause undue distension of the alimentary canal.

Several persons have called attention to the action of this substance when taken internally, in removing warts from the skin. The numerous cases of its complete success in destroying these unsightly excrescences render it well worthy of being more extensively tried. The dose of the medicine for this purpose is a teaspoonful morning and evening, continued for five or six weeks.

ADMINISTRATION.—The dose of carbonate of magnesia as a laxative is from 30 to 120 grains; as an antacid, from five to twenty grains.

¹ Toxicologie, i. 447.

² Brit. and For. Med.-Chir. Rev., April, 1859, p. 518.

Bull. de Thérap., kv. 524. Bull. de Thérap., xlii. 553, xliii. 478, xlv. 383.

proportion of mineral ingredients in a purgative dose of any one of them is quite inconsiderable.

Uses.—It is unnecessary to describe at length the cases in which sulphate of magnesia may be employed medicinally. It is taken incomparably oftener without a physician's advice than with it, and generally to overcome constipation, to arrest bowel complaints arising from irritating ingesta, and to subdue the febrile symptoms and the pain that attend the development of nearly all inflammatory diseases. The ordinary mildness of its action renders it a safe and efficient purgative. Sometimes it is united with tartar emetic in cases such as those referred to, either to effect a thorough evacuation of the alimentary canal, or, in addition to this, to make a strong sedative impression upon the system. It is also given in divided doses and with a small proportion of tartar emetic for the purpose of producing a sustained antiphlogistic action in inflammatory diseases of a high grade. Half a grain of the antimonial and an ounce of the saline medicine may be dissolved in a pint of water, and a wineglassful of the solution administered at intervals of three hours.

It has been advantageously employed by many persons in dysentery. M. Trousseau found it very successful in an epidemic which prevailed in 1826 in the neighborhood of Tours.' He daily gave a solution of about half an ounce of the salt in divided doses. Giacomini made use of much larger doses, such as an ounce and upwards at once, and with the effect of arresting all discharges abruptly. We have used this remedy in the same disease, dissolving an ounce of it in a pint of water and giving two ounces of the solution every two hours. From the commencement of its operation, the tenesmus and bloody discharges diminish; the former ceases altogether in a few hours, and the latter are exchanged for watery or feculent stools. It is probable that, to be successful, this method must be resorted to near the onset of the disease. It does not, of course, exclude depletion, nor, indeed, opiates, from the treatment. The latter may be exhibited at night in its stead, or on alternate days with the saline. The sthenic forms of the disease show the efficacy of the method most clearly.

In obstruction of the bowels by hardened fæces, by ileus or hernia, &c., Epsom salts ought to be tried, largely diluted and in frequently repeated doses. In painters' colic one of the best purgatives is sulphate of magnesia with an excess of sulphuric acid. The experiments of Orfila, Good, and Paris, says Dr. Copland, seem to favor its employment, and certainly unequivocal benefit results from the practice. But whether the benefit arises from reducing the lead to an insoluble salt, or from the operation of the sulphates in exciting the action of the partially paralyzed muscular coat of the bowels, and thereby enabling them to expel retained matter of a morbid or noxious description, cannot readily be determined."

ADMINISTRATION.—As a purgative, the ordinary dose of Epsom salts is one ounce, but this quantity is unnecessarily large. One-half of that

¹ Archives Générales, xiv. 33.

Dict. of Pract. Med. (Am. ed.), i. 440.

Its dose is from half an ounce to an ounce and a half. The latter salt is less soluble than the other saline medicines which have been noticed, but a smaller dose of it is purgative. Its action is apt to be harsh, producing colicky pain and a burning sensation in the abdomen. In several instances a fatal effect has resulted from doses of it varying from half an ounce to two ounces, and in many others it occasioned very alarming symptoms. In this country it is seldom used as a purgative, nor does it possess virtues entitling it to be more frequently employed.

POTASSÆ TARTRAS.—TARTRATE OF POTASSA.

HISTORY, PREPARATION, &c.—This salt was first described by

Lemery in 1675, under the name of sal vegetabilis.

It is prepared by the reaction of the bitartrate with the carbonate of potassa. The latter salt parts with its carbonic acid which escapes, and receives instead one equivalent of tartaric acid from the bitartrate. A neutral tartrate of potassa results.

This salt is in the form of white crystals of a bitter and disagreeable taste. It is soluble in four parts of boiling water. In alcohol, it is nearly insoluble. As found in the shops, it is generally in the form

of a white, granular powder.

Action and Uses.—It is regarded as promoting all of the secretions, and that of the kidneys in particular, when it is given in small doses and much diluted. In full doses it acts upon the bowels as a laxative. It is secreted by the kidneys as carbonate of potassa. Tartrate of potassa is used as a mild, cooling purgative in all affections requiring the employment of saline evacuants, and some writers have attributed to it a special action upon the liver and upon the portal system, but it does not appear to be more operative in these respects than other medicines of its class. It is, however, a milder purgative than the sulphates of soda and magnesia. It may be used with advantage in all cases of venous congestion within the abdomen, including those in which the hæmorrhoidal sinuses are enlarged and discharge blood. Formerly it was much the habit to use it in combination with rhubarb, senna, or manna. By its action upon the urine it forms a suitable agent for correcting the acidity of this fluid.

Dose.—From sixty grains to an ounce, according to whether it is intended to act chiefly upon the kidneys or upon the bowels.

POTASSÆ BITARTRAS.—BITARTRATE OF POTASSA; CREAM OF TARTAR.

DESCRIPTION.—Bitartrate of potassa is contained most abundantly in grape juice, but it also exists in many other acidulous vegetable

¹ Compare Lond. Med. Gaz., xxxiii. 54, 124; Mérar and De Lens, Dict. de Mat. Méd., v. 485; and Am. Jour. of Med. Sci., Jan. 1844, p. 88.

cream of tartar, constitute a certain and not disagreeable purgative. It is often associated with juniper berries in infusion (bitartrate of potassa and juniper berries, bruised, of each 3ss, boiling water Oj), and in the idiopathic forms of general dropsy few combinations are more efficient. In the form which so often occurs as a sequela of scarlatina it is of great service, either alone or associated with tincture of digitalis. With sulphur, it is a favorite laxative in hæmorrhoidal affections. With magnesia, it has been recommended in habitual vomiting arising from gastric acidity or from the state of pregnancy.

Dose.—As a cathartic, from half an ounce to one ounce; as a diuretic, from sixty to one hundred and twenty grains largely diluted, several times a day; or in the form of cream of tartar whey prepared by adding one hundred and twenty grains of the bitartrate to a pint of

milk.

SODÆ ET POTASSÆ TARTRAS.—TARTRATE OF POTASSA AND SODA. ROCHELLE SALT.

HISTORY AND PREPARATION.—This salt was discovered in 1672 by Seignette, an apothecary of Rochelle, hence it is generally known as Rochelle Salt, and in France as Sel de Seignette.

It may be obtained by adding bitartrate of potassa to a solution of carbonate of soda. In this process the excess of acid in the bitartrate saturates the soda, and liberates the carbonic acid. This salt occurs in beautiful prismatic crystals which have a saline and somewhat

bitter taste. It is readily soluble in cold water.

ACTION AND USES.—In doses of from half an ounce to one ounce it operates as a gentle and cooling laxative, and seldom disagrees with the stomach. It is particularly acceptable in the form of Seidlitz powders, which form an effervescing draught. In small doses it acts as an alkali upon the urine, and its vegetable constituent is digested and retained in the economy. As it is not incompatible with tartar emetic, the two agents may often be associated as an emeto-cathartic, or in smaller doses as an antiphlogistic medicine.

Dose.—As a purgative, from half an ounce to one ounce. As an antilithic, from sixty to one hundred and twenty grains several times

a day largely diluted.

OLEUM OLIVÆ.—OLIVE OIL.

DESCRIPTION AND HISTORY.—This is a fixed oil obtained by expression from the olive tree (Olea Europæa). This tree is a native of Asia, whence it was carried into Egypt, Barbary, Italy, Spain, and France. It is said to have been introduced into the last named country by the Phocean colony which inhabited Marseilles 680 years B.C. The history of the olive-tree runs back to the earliest period of which any record exists. The fig-tree is the only one mentioned before it. A

of sweet oil every morning is said to have been effectual in warding off the poisonous effects of lead among workers in the preparations of this metal. It has also been used in the same way as an antidote to

arsenical vapors.

Many writers have related examples of the efficacy of sweet oil in poisoning by venomous serpents and insects. An instance is contained in the Philosophical Transactions, of a peasant who was employed by the apothecaries to catch vipers, and who, whenever he was bitten by the reptiles, applied some sweet oil to the wound, and at the same time drank a glass of it. In this manner he escaped all mischief. Pouteau praised this method as effectual; but Murray, who quotes the above example as well as many others, concludes that the efficacy of the remedy is very doubtful, upon the ground, chiefly, that the viper's bite is seldom mortal. Yet it sometimes unquestionably is so. Quite recently (1849), four cases of death from this cause were published by M. Dusourd, who also presents a narrative of four others in which sweet oil was administered internally, and warm oil used by friction upon the affected limbs. These cases, the symptoms of which were extremely formidable, all recovered. The same writer states that compresses wet with warm oil speedily remove the pain and swelling of wasp and hornet bites, &c. Sweet oil may also be used to destroy insects lodged in the auditory passage when the swelling of its walls renders other methods difficult of application. Mérat mentions the case of a gentleman who, in order to rid himself of a tapeworm, drank about a pound and a half of sweet oil in doses of four ounces every quarter of an hour. The tænia was expelled within twenty-four hours. Emulsions containing sweet oil are sometimes used as vehicles for various expectorant remedies, but its advantages are very questionable, and for the purpose it is inferior to almond oil.

Externally sweet oil may be used as a dressing for excoriated surfaces, superficial burns, &c., but it is less grateful and less convenient than the various ointments and cerates which are intended for this purpose, and most of which contain olive oil. Of these the best is Lime Liniment (LINIMENTUM CALCIS). Inunctions with warm olive oil form an excellent remedy for promoting resolution in sprains and contusions, and have been found, like other unctuous substances, an efficient means of preventing and removing corns. For the former purpose Liniment of Camphor (LINIMENTUM CAMPHORÆ) is to be preferred. The ancient method of anointing the body with oil as a protection against the plague is still employed with confidence by the Orientals, but the ravages of the disease do not appear to be stayed by its means. If our modern notions upon the subject are correct, the disease could only be fostered by preventing the depuration of the body by the skin. Pliny mentions olive oil as a means of repressing perspiration, and in modern times it has occasionally been used to moderate the colliquative sweats of phthisis. Fomentations and frictions with warm oil in general dropsy do not appear to have any further efficacy than may be ascribed to their rendering the skin more supple and extensible, unless, perhaps,

¹ Apparat. Medicam., ii. 57.

² Bull. de Thérap., xxxvii. 489.

even upon stones and other lifeless objects, during the night. This name is also given to a substance resembling millet seed, which is said to have fallen from the air on the confines of Silesia and Poland and in other places, and which was used as food. Its nature is quite unknown. Finally, the term manna was applied to a very different substance, a species of gum resin, thus, or frankincense, in allusion to the manner in which it exudes from its native tree.'

Uses.—The medicinal qualities of manna appear to have been first pointed out by the Arabian physicians, who describe it as a laxative peculiarly adapted to children and pregnant women, on account of its mildness and as being a gentle cholagogue, and at the same time a suitable expectorant in febrile affections of the lungs. It was frequently prescribed by them in conjunction with senna, rhubarb, and tamarinds. Modern experience has added absolutely nothing to these statements. In his elaborate essay, Hoffmann has enlarged upon them as a text, but has not substantially increased our knowledge. Some modern authors have attributed to manna advantages over other laxatives in cases of disease affecting the genito-urinary apparatus. It is sometimes used instead of molasses to purge off the meconium in new-born infants.

ADMINISTRATION.—As a large proportion of the manna taken into the stomach is digested, it must be given in large doses in order to produce a movement of the bowels; it is, therefore, apt to create flatulence and epigastric oppression, besides leaving the digestive powers of the stomach feeble. It may be administered along with other purgatives, and, indeed, is generally so prescribed. One of the most frequent uses of it is with the infusion of senna, and particularly as an ingredient of the draught composed of this infusion, Epsom salts, and fennel seed. The dose of manna is one to two ounces; for young children, about an eighth part as much.

CASSIA FISTULA .- PURGING CASSIA.

HISTORY AND DESCRIPTION.—Cassia fistula is a native of India, whence it was introduced into Egypt and the surrounding countries, and thence into the new world. It is extensively cultivated in the tropical regions of America for ornamental as well as commercial purposes. The rare beauty of its flowers, which are large and of a golden yellow color, and are arranged in long pendent clusters, excited the admiration of the Arabian writers who furnish us with its earliest history. The fruit consists of long pendulous pods, which are cylin-

From manare, to trickle. This word is, in its turn, derived from the Chaldaic term for water; and not improbably the same fundamental idea of trickling or distilling, like dew. is associated with various products to which the word manna is applied. But O'Rorke has shown pretty conclusively that, besides the honey-dew mentioned in the text, the Israelites used and were chiefly sustained by a lichen of an amylaceous and very nutritious quality, which even to the present day is transported by the winds and falls in showers to a depth of several inches. (RANKING'S Abs., XXXIII. 285.)

^{*} EBN BAITHAR, i. 401.

usefulness in correcting nausea, quenching thirst, and allaying febrile excitement. They also speak of their utility in mouth-washes, and in

healing aphthous sores.

Actions and Uses.—Tamarind is regarded as laxative, refrigerant, antiscorbutic, and antiseptic, and may be used, mixed with water, as a cooling drink in febrile diseases. In the dose stated below, this medicine may also be employed to open the bowels, but it is seldom used alone for this purpose, but more generally as a constituent of the confection of senna. As the tartaric and citric acids of tamarind decompose most of the salts of potassa, tartar emetic should not be given in conjunction with it. It is also said to lessen the purgative action of senna.

ADMINISTRATION.—The dose of tamarind is from sixty grains to an ounce or more. By boiling an ounce of the pulp with a pint of milk, a whey is obtained which forms a pleasant and cooling drink in fevers.

OLEUM RICINI.—CASTOR OIL.

DESCRIPTION.—This oil is obtained by expression from the seeds of Ricinus communis, which, indeed, derives its name from the resemblance which they bear to the insect called a tick (ricinus). In its native country, Asia, the plant attains the dimensions of a tree, but in temperate climates generally, and in the United States, it is an annual plant. It is very extensively cultivated in several States of the Union, and particularly in those upon the right bank of the Ohio, for the production of castor oil. It was formerly called castus oil, or agnus castus, names which it received from its supposed power of repressing venereal passion, and from them its common title is derived.

Castor oil is a very viscid white or pale yellow liquid, which, when fresh and pure, is nearly or quite inodorous, and has a mild taste at first, but which becomes afterwards somewhat nauseous and acrimonious. It is lighter than water, and does not congeal above 0° F. By exposure to the air it dries and becomes rancid. It is soluble in pure alcohol and in ether.

HISTORY.—Pliny describes the castor oil plant, the mode of extracting oil from its seeds, and the etymology of its name as given above. He speaks of that which is prepared in Egypt as disgusting to mix with food, but as fit for burning.¹ Dioscorides and Galen both mention the purgative properties of the seeds, and the former states that an overdose of them occasions vomiting as well as purging, and that the oil is used to burn in lamps and as an ingredient of plasters. He does not allude to its internal use.² Mesue gives a full account of the seeds, which he calls royal, and dilates upon their various uses as a purgative. He also describes clysters of the oil as a remedy for colic, and inunctions of it as serviceable in piles and several external disorders, but he does not allude to its cathartic virtues. Nor do the later Arabian writers go further. They confine their descriptions to

The whole intestinal mucous membrane was found after death coated with blackish blood, the lining membrane of the stomach was somewhat reddened and softened.

The effect of injecting castor oil into the vein was tried by Hale upon his own person. After losing eight ounces of blood from the arm, he had half an ounce of the oil injected into the vein. At the expiration of twenty-five minutes he perceived the taste of the oil in his mouth; malaise succeeded, with nausea, eructation, rigidity of the facial muscles and of the tongue, loss of speech, anxiety and faintness, with general dulness and depression. At the end of three hours there was an unsuccessful motion to evacuate the bowels. Feverishness

followed, and indisposition of several weeks' duration.

Canvane states that by only rubbing the navel and hypochondria with this oil in children whom he could not get to take any medicine inwardly, he often procured one or two loose stools. The odor alone is said sometimes to produce a purgative effect upon weak and delicate By repeated friction with the oil the skin is reddened and children. ultimately vesicated. In the dose of one or two ounces it occasions an uneasy feeling in the stomach, and not unfrequently vomiting. But when taken in divided doses, as half an ounce at intervals of four hours, it seldom occasions vomiting, but more generally nausea, and the bowels are apt to be moved before the second dose. The second or even the third may sometimes be required for this purpose. It seldom produces much griping, unless the bowels are in a morbidly sensitive condition. The action of the pulse is lowered meanwhile, a sense of peculiar discomfort is felt in the abdomen, there is also an inclination to sleep, and general debility. The evacuations which it produces are, after the first one, generally liquid, but they contain more or less of the oil in the form of globules, and unchanged, or, as Dr. Bird has pointed out, converted into caseous flakes or a soap-like scum floating in the more fluid parts of the dejection. More generally it is found mixed up with the fæces as a kind of emulsion, and in some few instances it has been discharged under the form of solid tallowlike masses. Long-continued use of the oil disorders the digestion, and occasions habitual nausea, with a furred tongue, &c., particularly if the oil is acrid from having been kept, or from imperfect preparation. Cullen states that when taken habitually as an aperient the dose may be gradually diminished. This statement is confirmed by Burne,3 who says that it acts quickly, does not produce a subsequent costiveness, and the longer it is given the less is the dose of it required. If taken daily, the quantity may gradually be reduced to half a teaspoonful (Dr. Thompson says to a few drops), and yet the full effect be maintained.

Castor oil has been known, instead of acting as a purgative, to exude from the skin. Such a case is related by Dr. T. O. Ward, of an hydræmic female, who also presented the remarkable phenomenon of pulsation of the veins of the forearms.

4 Lond. Med. Gaz., x. 377.

On Habitual Constipation, p. 218.

¹ Times and Gaz., May, 1861, p. 555.

² Mitscherlich, Lehrbuch, i. 150; Wiemer, Wirkung, &c., iv. 413.

from the patient; and he mentions two cases of armed tænia expelled by three ounces of this oil, taken by a patient during three successive days, and by another taken twice a day for a week. Bremser' denies

that it possesses any specific vermifuge properties.

Among the numerous forms of disease for which castor oil is an appropriate medicine, acute inflammation of the lining membrane of the bronchia and air-passages may be mentioned. In this affection the medicine appears, more than any other of its class, to mitigate the inflammation and to promote the resolution of the disease by expectoration. The febrile symptoms after parturition, known as milk fever, and the forming stage of mammary abscess, are very generally controlled by a dose of castor oil; indeed, it is in a peculiar manner suited to be employed as a laxative in the puerperal state. Its gentle and certain action also renders it appropriate in the somewhat analogous circumstances of persons laboring under irritative fever, or simply from constipation after accidents or surgical operations. It is said to have a soothing influence in nephritic inflammation and nephralgia arising from the presence of calculi in the kidneys.

Externally.—The galactagogue and emmenagogue qualities of the castor oil plant have attracted considerable attention since Dr. McWilliam first gave the following account of its use in Africa: "In childbirth, when the milk is delayed, a decoction is made by boiling a handful of the plant in six or eight pints of water, with which the breasts are bathed for fifteen or eighteen minutes; part of the boiled leaves are also spread over the breasts. The process is said generally to induce a flow of milk in a few hours."2 The same physician has shown that the Spaniards of Peru were acquainted with the galactagogue qualities of this plant in the early part of the eighteenth century; and it also appears that the negro women of Jamaica poultice their breasts with the leaves, to cause a copious flow of milk. Dr. Tyler Smith published several cases in which a decoction of the leaves was used after the manner described above, and with a prompt and very marked increase of the secretion of milk, with swelling and hardness of the mammæ, and pains in the back. Dr. Routh pronounced an equally favorable judgment upon the value of the medicine, which he was the first to administer internally in the form of a decoction, and afterwards of a tincture and an extract. Subsequently, Dr. Gilfillan produced equally striking effects by teaspoonful doses of a fluid extract of the leaves. Dr. Cormack has objected to attributing galactagogue virtues to the castor oil plant, alleging that hot fomentations and sinapisms will have the same effect, of which he presents several striking illustrations; but it is to be remarked that the irritation produced by the castor oil leaves is very trifling, that their application has proved successful in exciting a secretion of milk when warm fomentations, friction, and stimulating liniments remained inoperative, and, above all, that the internal administration of the extract has produced the

Ueber lebende Würmer im lebenden Menschen, p. 163
Lond. Jour. of Med., ii. 1085.
Lancet, Sept. 1850.
Lind., p. 951.

[•] Times and Gaz., June, 1859, p. 574; Brit. Med. Jour., Dec. 1859.

[•] Amer. Med. Times, iv. 23, 218. RANKING's Abstract (Am. ed.), xvii. 276.

same effects as the local application of the leaves. Nor is the familiar fact to be overlooked that a dose of castor oil is habitually given to lying-in women as soon as the first signs of the milk fever manifest themselves. The universal preference for this over every other evacuant is very probably founded upon habitual experience of its special usefulness.

Dr. Nott treated with success, in the Charity Hospital of New Orleans, two patients laboring under amenorrhæa, by rubbing the breasts three times a day with a decoction of the leaves of Ricinus communis, and afterwards applying to the same parts the leaves which had been used to prepare the decoction. The oil forms one of the best ingredients of ointments and liniments used in the treatment of alopecia.

ADMINISTRATION.—Various methods have been contrived to diminish the repugnance of the palate to this medicine. It is frequently given in emulsion with the yolk of egg, or with gum Arabic, but these mixtures lessen its activity as a purgative. It is also administered floating upon mint-water, milk, coffee, &c.; but not only do these vehicles fail to disguise its taste effectually, they are also apt to become objects of aversion in consequence. If the mouth and fauces are washed with brandy or strong wine, and the oil is taken from a glass the interior of which has been moistened in like manner, it will not adhere sufficiently to excite disgust. But of all methods the best is to envelop the oil with foam of ale or porter in a wineglass. The oil then forms a large globule, which may be swallowed without even its presence being detected.

SENNA.

DESCRIPTION.—This medicine consists of the leaflets of Cassia acutifolia, C. obovata, and of C. elongata. These plants are chiefly natives of Egypt and Arabia, but they have been transplanted to the East and West Indies, and are successfully cultivated there. The senna of commerce is principally derived from the port of Alexandria in Egypt. The plants which produce it are shrubs, or small trees, according to the region where they flourish. The leaflets are narrow, pinnate, and lanceolate, and the legumes oblong, membranous, and about half an inch in length.

Senna has a nauseous and bitter taste, and a somewhat fragrant odor, but an extremely sickening smell, when infused. It is this property, more than any other, which excites so general a repugnance to taking it. Besides other principles it contains a volatile oil, upon which its odor depends, and cathartin, from which it derives its characteristic taste and its purgative properties.

The principal officinal preparations of senna are the following:—

Confectio Sennæ.—Confection of Senna; Lenitive Electuary.
This confection contains, besides senna, coriander-seed, liquorice-root,

¹ Phil. Med. Exam., April, 1855, p. 246.

figs, pulp of prunes, tamarinds, and purging cassia, besides sugar and water. Its dose is one hundred and twenty grains.

Extractum Sennæ Fluidum.—Fluid Extract of Senna.

From sixteen troyounces of senna in moderately fine powder a tincture is procured with diluted alcohol, which, after evaporation and the addition of eight troyounces of sugar, should measure a pint. Dose, half a fluidounce.

Infusum Sennæ.—Infusion of Senna.

The infusion of senna is prepared with a troyounce of senna, sixty grains of bruised coriander-seed, and a pint of boiling water, allowed to macerate for an hour in a covered vessel, and strained. The dose is four fluidounces.

Tinctura Rhei et Sennæ. — Tincture of Rhubarb and Senna; Warner's Gout Cordial.

Its virtues are due to the rhubarb rather than to the senna which it contains.

HISTORY.—Arabian writers furnish the earliest notice of this medicine. One of them, Isaac Ben Honain, recommends the fruit as a purge in melancholy, and also as an application to chapped hands. He adds that it is sometimes useful in muscular cramps, alopecia, calvities, obstinate headache, phthiriasis, scabies, pustular eruptions, pruritus, the lousy disease, and epilepsy. Another writer describes it as apt to create uneasiness in the bowels, unless when associated with violets or some other corrective. He recommends an infusion or decoction of senna. Haly Abbas refers to similar combinations for the same purpose, and particularly to a decoction of senna with prunes and spikenard. Ever since its first introduction into the materia medica it has been very extensively used as a purgative, a fact which better than any reasoning about its powers demonstrates its value.

ACTION. On Animals.—A decoction of senna injected into a dog's veins produced agitated movements of the abdomen and bilious vomiting. It readily purges swine, dogs, and cats, and in large doses horses also.4

On Man.—The odor of senna-leaves, or that of its infusion, is sufficient to cause an evacuation of the bowels in certain susceptible persons. Bergius states that it renders the milk of a nursing female purgative to her infant. This fact proves the absorption of its active principle. It is very apt to create flatulence and colic, unless associated with some aromatic substance. Schwilgué describes it as exciting a sense of warmth in the abdomen, and some acceleration of the pulse; he states also, that it produces yellow stools, and that its action is not followed by constipation. It is, hence, probable that the action of senna is exerted chiefly upon the small intestine. There is, perhaps, no instance on record of its having produced hypercatharsis. Its operation is said to be much increased by an association with bitter medicines, and

¹ Rem Baithar, Heil- und Nahrungslehre, ii 58. ² Adams, Comment. on Paul. Æginet., iii. 432.

WIBMER, Wirkung, &c., ii. 67.
MITSCHERLICH, Lehrbuch, &c., ii. 633.

imported article." Dr. Eberle frequently employed it instead of the latter, and always found it a certain and safe purgative.1

RHEUM. — RHUBARB.

DESCRIPTION.—The plant which produces the best qualities of rhubarb is still unknown. The United States Pharmacopæia refers the drug to "Rheum palmatum, and other species of Rheum." The root is the officinal part. All the plants of the genus Rheum "are perennial and herbaceous, with large, branching roots, which send forth vigorous stems from four to eight feet or more in height, surrounded at their base with numerous very large petiolate leaves, and terminating in lengthened branching panicles composed of small and very numerous flowers, resembling those of the rumex or dock." roots are thick, ligneous, and of a yellowish color.

The greater part of the rhubarb of commerce comes from the North of China through Tartary and Russia. It is generally known as Turkey rhubarb, because it anciently, and, indeed, until recently, entered into commerce through that country alone. The plant which produces it is entirely unknown. Another portion derived from the same original source is imported from Canton, and is called India rhubarb. It is also cultivated for medicinal purposes in England and

France.

As found in commerce, the several varieties of rhubarb differ somewhat among themselves in physical characters, but the following are the most essential: It consists of sections of the root without the cortex, which are more or less cylindrical in shape, and either of a bright or brownish-yellow color. The fracture is uneven, and presents a mixture of brownish-red and yellowish veins and spots. The odor is peculiar and somewhat aromatic, particularly in the Russian variety. Its taste is slightly bitter and astringent, and, owing to the presence of crystals of oxalate of lime, in the proportion of more than thirty grains to one hundred of the root, it feels gritty under the teeth. When chewed, it colors the saliva yellow. The English and French rhubarbs are rather reddish than yellow, are of lower specific gravity, more mucilaginous and astringent than aromatic, and scarcely feel gritty when chewed.

Rhubarb yields its medicinal properties to water and alcohol. It is uncertain upon what elements these properties depend; but probably not upon any single one, but rather upon the resinous, astringent, and bitter principles combined. The active principles of rhubarb, according to Schroff, are chrysophanic acid, rhein and rhabarbarin. All of

these substances are purgative, but the second is the most so.

The following preparations of rhubarb are officinal:—

Extractum Rhei Alcoholicum.—Alcoholic Extract of Rhubarb. This extract is prepared by percolation from rhubarb in coarse

GRIFFITH, Med. Bot., p. 261; EBERLE, Mat. Med., p. 147. ² U. S. Dispensatory.

same general properties of the tincture of rhubarb, but is less stimulating. Dose, from one to four fluidrachms, repeated if necessary.

HISTORY.—The names Rhabarbarum and Rheum are derived from that of the river Rhâ (Volga), which empties into the northern extremity of the Caspian Sea, because from this direction rhubarb was anciently, as at present, brought to the countries bordering on the Levant. The term Rha-pontic, applied to the species of rhubarb described by Dioscorides, refers to its source in ancient Thrace, near the Pontic or Euxine Sea. The name Rhabarbarum, whence Rhubarb is immediately derived, is applied by several ancient writers to the drug brought from the barbarous regions of the north, for Mesuel describes three sorts of it (rhâ), viz: "Indianum, Barbarum, et Turcicum."

Rhapontic rhubarb possessed no purgative properties, but was used as a stimulant astringent.2 The first definite account of purgative rhubarb is contained in the works of the Arabian physicians. Thus, Ebn Dschamia mentions four varieties of the drug. The first, which he calls Syrian, was probably the non-purgative variety; the others were the Chinese, the Tartar, and the Turkish or Persian. Arabians describe the last three as purgative, and the Turkish as preeminently so. Ebr Baithar's speaks expressly of the ignorance of the earlier physicians respecting the cathartic properties of rhubarb, and ascribes the publication of them to his countrymen. They have proved, he says, that it acts as a deobstruent by removing inspissated mucus and all concocted juices, and strengthens the liver, the stomach, and the rest of the internal organs. It is useful, he continues, in mental disorders, and in all dropsies except those which depend upon atony of the intestines. In chronic diarrhoea depending upon abdominal infarctions it is a curative when mixed with wine and Indian spikenard, and in dysentery also when combined with medicines which abate its purgative operation and promote its astringent and healing action. It cures the stone in its forming stage and favors its disintegration; is useful in uterine hemorrhage, in hemicrania depending upon disordered digestion, and as an external application with vinegar to various dry eruptions of the skin. These form but a small portion of the cases in which Arabian authors recommend rhubarb, but they are also the most important and intelligible. Matthiolus states that powdered rhubarb is astringent, and becomes more so when it is roasted.

ACTION. On Animals.—In large doses it purges horses; in doses of one or two drachms it sometimes acts on dogs as a cathartic, but not uniformly. Tiedemann and Gmelin' found that after the exhibition of rhubarb the serum of the blood of the mesenteric, splenic, and portal veins was tinged yellow, but the chyle was unaffected; the urine was of a dark yellow color, and on the addition of caustic potash turned brown.

On Man.—The primary effect of rhubarb is purgative; its secondary

MATTHIOLUS, Comment., iii. 2, p. 247. Comp. Pancirollius, Nova Reperta, ii. 121.
Dioscordes, iii. 2.
Heil- u. Nahrungsmittel, i. 484.

DIOSCORIDES, iii. 2.
MITSCHERLICH, Lehrbuch, i. 333.

tive in the bowel-complaint of summer, and particularly among children. In this disorder it is that the aromatic syrup of rhubarb is so generally and beneficially employed. The combination of rhubarb with tonic infusions is also serviceable in the same affection; if the stools are pale and mucous, it may be associated with mercurials, and if there is a predominance of acid, magnesia may be substituted for the latter, or given in addition. Burnt rhubarb has already been mentioned as an old remedy for diarrhæa. It has recently been recommended anew by Mr. Hoblyn. He caused rhubarb to be burned in an iron crucible, stirring it until it was blackened; it was then smothered in a covered jar. For more than twenty years he says that he used it successfully in incidental diarrhæas, giving it in doses of from five to ten grains. After one or two doses the pains quickly subsided, and the bowels returned to their natural state. He found it

equally useful in the diarrhœa of phthisis.

According to Murray, opinions are unanimous in favor of rhubarb in dysentery, but they differ in regard to the proper occasion for its The best authorities do not, on the whole, confirm this employment. statement. Degner is perhaps the only one who is an exception. He recommended the medicine in all stages of the disease as abundantly able to effect the cure alone. Pringle, after the example of Barbette and of Degner, made use of the remedy in "winter and vernal fluxes," but he does not seem to have depended much upon its efficacy. Murray, himself, thought it most suitable when the disease tends to become chronic, and debilitating evacuants are no longer proper. then, he says, acts as an astringent and tonic.3 Richter and also Cullen, condemned it in acute dysentery; and Zimmerman agrees with Monro and Brocklesby, whom he quotes, that in general the medicine is appropriate only after the acute stage of the disease. certain epidemics, when the stomach rejected manna, tamarinds, and neutral salts, he found the tincture of rhubarb sometimes advantageous. On the whole, it is evident that rhubarb is of very subordinate value in the treatment of dysentery.

Externally.—Powdered rhubarb has been recommended by Home as an application to old and indolent ulcers for the purpose of promoting their granulation. Eberle says that he derived much benefit from sprinkling indolent chancres with a powder composed of about sixty grains of very finely-powdered rhubarb with twenty grains of calomel and ten of powdered opium. The share of the rhubarb in the benefit

must, however, have been trifling.

ADMINISTRATION.—Rhubarb is administered in a great variety of forms, including the powder, infusion, tincture, syrup, and in combination with nearly all medicines of the cathartic class. In powder, the average dose, as a purgative, is twenty grains; as a gentle aperient and tonic, five grains. When associated with calomel, its action is prompt and efficient; this combination is much used at the commencement of autumnal fevers. With magnesia it is employed in

Lancet, Feb. 1841, p. 790.

Apparat. Med., iii. 396.

[•] Traité de la Dysentérie, chap iv.

² Diseases of the Army, p. 235.

⁴ Mat. Med., ii. 530.

dyspepsia with acid eructations and torpor of the bowels. As a mild laxative for habitual or occasional use, the simple rhubarb pill (Pil. rhei) which contains soap, is an eligible form. The infusion is generally employed as a vehicle for other purgatives or for vegetable tonics. The tinctures of rhubarb are almost exclusively used in cases which require a stimulant cathartic; their dose is from half a fluid-ounce to a fluidounce. The simple and the aromatic syrups of rhubarb, the latter especially, are very useful laxatives in the bowel complaints of children, particularly during the summer season. The fluid extract is an efficient preparation of rhubarb in the dose of half a fluidrachm. The various combinations of this medicine, which are only of secondary importance, need not here be mentioned.

JUGLANS.—BUTTERNUT.

DESCRIPTION.—Juglans cinerea is a native American forest tree. Its immature fruit is familiarly used in the preparation of pickles, and when ripe its kernel is eaten by those who do not object to its strong and oily taste. The inner bark of the root is its medicinal portion. Applied to the skin it is capable of producing vesication. A decoction of it is sometimes used in domestic practice, but the extract (Extractum juglandis) is generally preferred. In doses of from fifteen to thirty grains the latter is an active cathartic, and operates without occasioning heat or irritation.

It is said to be peculiarly applicable as an aperient in habitual costiveness, since it does not tend as much as many other purgatives

to leave the bowels in a confined state.

COLOCYNTHIS.—COLOCYNTH.

Description.—Colocynth is the fruit, deprived of its rind, of Citrullus Colocynthis, a plant which grows wild in Asia Minor, Syria, Nubia, Egypt, the Greek Islands, Japan, and at the Cape of Good Hope. It is cultivated in the South of Europe, and especially in Spain, and is about the size of an orange-tree. The fruit is globose, and measures from two to four inches in diameter; it has a yellow, smooth, hard, and thin rind, which is generally removed before the fruit enters into commerce. The pulp is nearly white, light, spongy, porous, tough, elastic, and contains numerous seeds around its circumference, arranged in double rows. It is intensely bitter and nauseous. These qualities are supposed to be derived from a proximate principle called colocynthin, a reddish-brown or light-yellow, brittle, and pulverizable substance, of an extremely bitter taste, and soluble in water and in alcohol.

The principal officinal preparations of colocynth are

Extractum Colocynthidis Alcoholicum.—Alcoholic Extract of Colocynth.

This extract is procured from the pulp of colocynth in powder, by

maceration in diluted alcohol, by percolation, and by evaporation. Forty-eight ounces of the pulp yield about seven troyounces of extract. Use, to form the compound extract.

Extractum Colocynthidis Compositum.—Compound Extract of Colocynth.

This preparation contains alcoholic extract of colocynth, aloes, scammony, cardamom, and soap, united by mixture. It is an efficient cathartic in the dose of ten grains.

HISTORY.—Hippocrates directed a tampon covered with colocynth to be introduced into the os uteri for the purpose of bringing on labor artificially in cases in which abortion takes place regularly at the same period of pregnancy.1 Dioscorides speaks of the intense bitterness of the fruit, and of its cathartic properties, which he describes as so powerful as sometimes to produce bloody stools, besides thoroughly cleansing the bowels. He alludes to the use of it described by Hippocrates, and recommends a suppository of it as a purgative; he also states that its fresh juice is useful in sciatica when rubbed upon the painful part.* Galen notices the fact that, in spite of its bitterness, it has none of the properties of bitter medicines, but is an active cathar-Rhazes and other Arabian writers state³ that it purges mucus and bile, is useful in paralysis, spasmodic diseases, headaches and other head affections, including insanity. It was much recommended in gout and rheumatism. In cold weather it is said to be very apt to occasion borborygmi and colics, and during the heats of summer to bring on dysentery. One writer speaks of it as an ingredient in a hair-dye, and another as a remedy for alopecia and scaly eruptions of the scalp. It was held in great esteem as a cure for scorpions' bites, and a decoction of it in oil was used by dropping into the ear to relieve tinnitus. Its acrimony was said to be corrected by an admixture with gum Arabic or tragacanth, and the addition of aromatics, salines, and aloes was advised to render its purgative action more gentle. Its poisonous effects are described by Matthiolus as identical with those of scammony and other drastics, viz., bloody stools, with violent pain and inflammation of the bowels.

ACTION. On Animals.—Unless in large doses, it acts but feebly upon horses, sheep, and swine. According to Orfila's experiments on dogs, this substance purges, inflames the lower bowels, and at the same time depresses the nervous system. In doses of about seven and four grains, administered to two rabbits, Schroff found that colocynthin proved fatal in the course of four hours, after producing copious fluid dejections. The gastro-intestinal mucous membrane was found to be highly inflamed.

On Man.—At the Cape of Good Hope colocynth is said to be eaten by the inhabitants as a pickle, without injury. In the North of Africa the seeds are reported to be extensively used as an article of food, and to be mild, oleaginous, and nutritious. But the seeds of commercial

De Superfætatione, xii.

^{*} EBN BAITHAR, ed. Sontheimer, ii. 284.

Toxicologie, ii. 108.

² Lib. iv. chap. clxxi.

WIBMER, Wirkung, ii. 230.

⁶ Reil, Mat. Med., &c., p. 129.

been much used as a vermifuge. An example has already been cited, but the medicine does not appear to have any specific power of destroying intestinal worms. As a hydragogue cathartic it is sometimes useful in dropsy, provided the strength of the patient enable him to sustain its debilitating influence. It has also been prescribed by Hufeland with a view to a diuretic operation, which there is no evidence of its possessing; for, as he administered a decoction of it in beer, whatever diuresis ensued may fairly be attributed to a property of the vehicle. In coma, apoplexy, and paralysis so far as these affections are susceptible of relief by a derivation upon the bowels, colocynth will often be found useful as an active cathartic. In paralysis of the bladder, for which it has been especially recommended, the local irritant action of the remedy upon the rectum may perhaps combine with its evacuant properties in attaining the object proposed. It has been employed successfully as a cathartic in melancholia and other forms of mental derangement depending upon, or at least connected with, torpor of the intestinal canal. Chrestien professed to have cured mania by frictions of the abdomen with a solution of the extract of colocynth. He affirmed that it produced diuresis as well as purged. This medicine, like other drastic purgatives, was anciently resorted to, and is still used, to promote the return of suppressed menses, as well as with the criminal purpose of producing abortion. Either of these results it may sometimes bring about, but the danger of committing a double crime in the latter case, and of occasioning violent symptoms in the former, ought to be sufficient to dissuade from its use generally in amenorrhœa, and universally in pregnancy. Like various other purgatives, colocynth has been found useful in subacute gonorrhood, or after the acute stage of the ordinary form.

Administration.—Colocynth, or its extract, is seldom administered alone, but nearly always in such combinations as are supposed to mitigate the severity of its operation. As a stimulant to the digestive organs the pulp is recommended (Richter) to be given in doses of from one-eighth to one-half of a grain, and gradually increased until the urine becomes more copious, or some looseness of the bowels supervenes. As a laxative the dose is from two to five grains, and as a drastic purgative from five to ten grains, three or four times a day. "It is best administered in a state of minute division, effected by trituration with gum or farinaceous matter." Of the alcholic extract of colocynth the average dose is about five grains. It may be applied endermically to the epigastrium, after having been dissolved in alcohol and incorporated with lard. The compound extract described above is an excellent purgative in cases of constipation attended with torpor of the liver, and whenever copious evacuations from the bowels are desired. It forms the basis of the compound cathartic pills, which contain, in addition, extract of jalap, calomel, and gamboge, and which may be given in the dose of about ten grains, or three pills.

RICHTER, Ausfürl. Arzneim., ii. 363.

Made into an ointment and rubbed upon the shaven skin of a dog, it is said to have produced diarrhoea with tenesmus and bloody stools. When given to horses in large doses, jalap sometimes acts as a purge, but experiments with it upon these animals have yielded no very uniform results. In some cases the discharge of urine was increased, in some the animals were purged, in one gastritis and death followed, and in others little or no effect was produced.

and in others little or no effect was produced. On Man.—Jalap is thought to hold a middle place as a purgative between gamboge and senna, and closely to resemble scammony in its action. When chewed it is apt to produce a flow of saliva and a pricking sensation in the fauces. Murray says that daily experience proves it to be a safe and efficacious purgative in chronic diseases, although, in consequence of the variable proportion of resin which it contains, the effects are somewhat uncertain. He adds that it is best suited to persons of lax fibre, and agrees with Wedel that it may be advantageously used as a purgative even for the youngest children, and for persons advanced in life. The peculiarities of jalap as a cathartic have been accurately described by Wedekind. The nausea, he remarks, which jalap often occasions shows that it is not without an irritant action upon the stomach, but as this is transient, and the stools which speedily follow are watery, its operation appears to be expended upon the intestines, and, indeed, upon their glandular element. The copious secretion which it excites dissolves and dilutes the fæces. Its rapid action and the character of the discharges suggest the belief that it is at first absorbed into the blood and is afterwards secreted from the bowels; and this is the opinion of the most recent investigators of the subject.3 It does not, however, appear to communicate its cathartic properties to the milk of nursing women, nor to be absorbed by the skin. The form in which Wedekind used the medicine was the following: B.—Resinæ jalapæ gr. xxx; pulv. lycopodii gr. v; saponis medicin. gr. xc; amygdal. dulc. excorticarum gr. cxx.—M. exacte triturando. Ft. pil. cxx. Consp. pulv. lycopodii. Four of these pills contain only one grain of the resin of jalap. Two of them are sufficient to produce one copious stool, four of them three or four stools, and eight of them seven or eight liquid discharges in a healthy condition of the bowels. In many cases a single pill suffices for one evacuation. Soon after being taken, slight nausea and a movement in the stomach are perceived. Within a quarter of an hour more, a like sensation is felt near the centre of the abdomen; in another half hour it is experienced near the cæcum, followed by movements in the transverse colon, with slight colic and flatulent rumbling, and in two hours from the commencement there is a disposition to go to stool. Whether one, two, or eight pills were taken, they operated within the same space of time or not at all. The first discharge was generally thick, but mixed with liquid, and had rather a sour smell. The daily and habitual use of the jalap did not appear to lessen its effects. The operation even of large doses (e.g., eight or ten pills) seldom continued

^{&#}x27; Apparat. Med., i. 758.

Beiträge zur Erforschung, &c., p. 83.

[•] HEADLAND, on Medicines, p. 84.

from sixty to one hundred and twenty grains of bitartrate of potassa with ten or fifteen grains of jalap. The extract, being made with water as well as alcohol, contains both gum and resin. It has no advantage over the powdered root, but is generally prescribed in about one-half the dose. The resin or alcoholic extract is reckoned to be from two to four times as strong as jalap itself, and may be given in doses of about five grains. It should be thoroughly triturated with sugar, almond emulsion, or some other proper substance, in order to promote its subdivision. The syrup of rhubarb is said to have the property of completely dissolving it, so as to favor its operation in a remarkable degree. The old tincture of senna and jalap (Elixir salutis) which is prepared with aromatic seeds, may be given as a purgative, in the average dose of half an ounce, when the digestive powers are enfeebled by too stimulating a diet. It is no longer officinal.

SCAMMONIUM.—SCAMMONY.

DESCRIPTION.—Scammony is the concrete juice of the root of Convolvulus Scammonia, a native plant of Syria and the adjoining countries. It comes in masses or cakes of a dark olive or slate color on their external surface, but somewhat lighter within. It is pulverizable, almost insoluble in water, with which it forms a milky and somewhat greenish emulsion, is rather more soluble in vinegar, and still more so in ether, alcohol, or a solution of potassa. It has a strong and peculiar odor, which has been compared to that of old cheese, and when held in the mouth for some time it has a slightly acrid taste.

Resina Scammonii.—Resin of Scammony.

From a tincture prepared by percolation and concentrated the resin is precipitated by water. The dose is from five to twelve grains. It is best administered by being rubbed up with unskimmed milk, in the proportion of seven grains of the resin to three fluidounces of milk.

HISTORY.—It has been questioned whether the scammony (σχαμμονιον) of Greek physicians was the same as our own. Dr. Adams says that without doubt it was.² They employed it in febrile as well as nonfebrile affections, when the stools were bilious, &c. Pliny³ describes it as a cholagogue, alludes to its griping operation, and recommends its combination with aloes. Celsus⁴ speaks of it as a remedy for tapeworm. Dioscorides states⁵ that it purges mucus and bile; that to increase its action black hellebore may be associated with it; that boiled in vinegar and mixed with barley flour it forms a useful poultice in sciatica; that a tampon saturated with its juice destroys the fœtus in utero; and that prepared with vinegar it is used as a local application in cutaneous diseases. Hobaisch speaks of its causing borborygmi, colic, and excoriation of the bowels, to which a later Arabian writer adds cold sweats, syncope, and sometimes even death.⁶

¹ Bull. de Thérap., xxvi. 488.

³ Hist. Nat., xxvi. 38.

⁵ Mat. Med., lib. iii. cap. 145.

² Comm. on Paul. Æginet., iii. 341.

⁴ On Medicine, iv. 17.

⁶ EBN BAITHAR, ed. Sontheimer, ii. 27.

GAMBOGIA.-GAMBOGE.

DESCRIPTION.—Gamboge is a gum resin, consisting of the concrete juice of an undetermined tree which grows in Ceylon and the Indian Archipelago. It is obtained by incisions made in the bark of the trunk, twigs, and 'leaves of the tree, and is allowed to harden upon these parts, or is collected in cocoa-nut shells, or in the hollow of bamboo stems. This substance is brittle, and has a conchoidal fracture, the surface of which is somewhat shining, and of a reddishyellow color. In the mouth, its taste is not at first perceived, but if retained for some time it makes an acrid impression, and renders the fauces dry. It stains the saliva yellow, is inodorous and inflammable, burning with a white, sparkling flame, and abundant smoke. It is entirely soluble in alcohol and ether, and is precipitated by water from these solutions.

Gamboge is a constituent of Compound Cathartic Pills, of which three, or about ten grains of the mass, are an active purgative dose,

and of which gamboge forms less than a tenth part.

HISTORY.—Gamboge became known in Europe in the year 1603, through Clusius, who received some of it from Cochin China. Its source was indicated by a Catholic missionary in that country, who also described the mode of preparing it. The officinal name is said to be derived from the province, Cambodia, in which the drug is collected. The natives make use of it as a pigment, and also as an emeto-cathartic medicine, and a hydragogue in dropsy. The females resort to it as a means of procuring abortion. After its introduction into Europe, gamboge was employed in congestion of the brain, jaundice, rheumatism, and other diseases in which a powerful purgative action was thought useful; but the harshness of its operation soon caused it to be laid aside, or used only as an adjuvant to other purgatives. By some it was associated with acids, which were supposed to mitigate the severity of its action.

Action. On Animals.—The effects of gamboge vary considerably in different animals, and also in the same species according to the dose and mode of administration. Flohrmann found that fifteen grains given to a horse two years old produced malaise, agitation, a frequent pulse, twitching of the muscles, distension of the abdomen, thin alvine discharges, and trembling of the whole body. Viborg gave an ounce to a nine months' foal, producing eleven evacuations within four hours, while a like dose administered to a horse had no effect whatever.² The last-named experimenter, and also d'Aubenton, found that sheep were purged by from twenty to sixty grains, and that two drachms were often fatal. Drachm doses caused vomiting and purging in dogs, but if the æsophagus was tied the animal only made straining efforts, trembled, grew faint, and was purged. In an experiment of Orfila,³ half an ounce caused efforts at vomiting, but did not

MURRAY, App. Med., iii. 110 and 654.

² WIBMER, Wirkung, &c., ii. 388.

^{*} Toxicologie, ii. 112.

made and so often repeated, we have discovered none except a single case published a hundred and eighty years ago by Paullinus.' It seems that a barber surgeon administered a drachm of the medicine, for what purpose is not stated, and produced violent vomiting and purging, with fainting and "six hundred other mischiefs which deserve to be mourned with tears of blood." The patient, however, did not die immediately, but after some time and much suffering perished. In all of the fatal or imminently dangerous cases attributed to the action of gamboge the effects appear to have been produced by excessive doses, not of gamboge, but of certain quack pills, of which aloes and colocynth as well as gamboge, and perhaps other substances still more acrid, were constituents. The most definite notions of the operation of gamboge in disease are presented by the results of Rasori's experiments.2 The views of this author were originally published in 1807, and are contained in the following proposition: "A disease distinguished by certain symptoms, and an agent having the property of producing like symptoms being given, the latter, instead of aggravating the disease, will remove it, provided that the remedy be in opposition to the existing diathesis." After showing that nearly all preceding writers regarded gamboge as a violent and dangerous remedy, Rasori relates a number of cases in which he employed it for the cure of diarrhoea and dysentery, in doses of from five to twenty grains in twenty-four hours. They seldom excited vomiting and never colic; but, on the contrary, relieved the latter symptom if it was present. Identical results have been published by Castiglione,4 who, like Rasori, insists upon the fact that the medicine is much more readily tolerated when the bowels are inflamed than when they are in their natural condition. This assertion is directly opposed to the general belief of physicians.

Uses.—Gamboge is recommended in obstinate constipation connected with congestion of the liver or spleen, and serving directly either to cause jaundice or to prolong intermittent fever, &c. It is, however seldom given alone, but either with calomel, which is said to render its action much milder, or combined with other resinous cathar-

tics, as in the compound cathartic pills.

Many writers might be cited in proof of the efficacy of gamboge in dropsy, and particularly in anasarca, although some insist upon its efficacy in ascites also. Nearly all of them admit the extreme harshness of its action, and seem solicitous to devise means of correcting this objectionable quality. The greater number caution against its use in atonic dropsy, as well as when the patient is feeble; but some, like Werlhof, insist upon its superiority to other cathartics, whatever may be the state of the patient's strength. Cullen, who was led to abandon the exhibition of the medicine in full doses on account of

4 Annales de Thérapeutique, iii. 444.

¹ Ephemer. Natur. Curios., Dec. 1, Ann. viii. p. 139.

² Opuscoli di Med. Clin., ii. 73.

This doctrine, which is nearly identical with that of Hahnemann, was evolved quite independently of the latter, and led to a far different, and indeed diametrically opposite, method of therapeutics.

in water three or four times a day; or R.—Gamboge 3ss; carbonate of potassa 3j; brandy Oj.—Mix. Dose, one or two fluidrachms. (Oesterlen.)

ALOE. - ALOES.

DESCRIPTION.—Aloes is the inspissated juice of several species of aloe. The plants which furnish this medicine belong to the natural family of Liliaceæ, and are very widely disseminated. They abound upon the shores of the Mediterranean and of the Red Sea, at the Cape of Good Hope, and in the East and West Indies. They are usually from one to two feet in height, and have fleshy, ensiform leaves armed on the edges with spines or serratures. The aloes of commerce is obtained by evaporating the juice which exudes from transverse incisions made in the leaves, or from the footstalks of the latter when they are torn from the stem. The principal commercial and officinal varieties are the following: 1. Socotrine aloes (ALOE SOCOTRINA), also known as Indian aloes: Turkey aloes is furnished by A. socotrina. The hardened portions are of various colors. Sometimes they are of a garnet red, sometimes of a pale or golden red, and, when powdered, of a bright yellow color; their fracture is vitreous and generally conchoidal; the odor of the freshly-broken pieces, especially when breathed upon or heated, is very fragrant, and the taste is bitter and somewhat aromatic. 2. Cape aloes (ALOE CAPENSIS) is the most abundant variety of this drug. It is procured from A. spicata and other species of aloes. By the German writers it is called shining aloes. When freshly broken it has a very dark olive or greenish color, approaching to black, presents a smooth, bright, almost glassy surface, and, if held up to the light, appears translucent at the edges. The powder is of a fine greenish color. The odor is strong and disagreeable, but not nauseous, nor, on the other hand, aromatic. 3. Barbadoes aloes (Aloe Barbadensis) is the inspissated juice of the leaves of A. vulgaris. It is of a dark brown or blackish color, and sometimes of a reddish brown or liver color; the fracture is generally dull, the taste nauseous and bitter, and its odor, which is unpleasant, is rendered still more so by breathing upon it. The powder is of a dull olive yellow color.

Aloes contains a bitter principle called aloesin (but which is probably a compound of several proximate principles), a peculiar resin, and an acid having a close affinity to gallic acid. It is soluble in alcohol, ether, and boiling water. Messrs. T. and H. Smith obtained from aloes a substance which they regard as its cathartic principle, and which they term aloin.' It is crystalline and soluble in alkaline liquids and hot alcohol. It operated as a purge in doses of one or

two grains.

The officinal preparations of aloes are very numerous, but the following are the most important:—

¹ Month. Jour. of Med. Sci., Feb. 1851, p. 127.

operation upon the stomach." He states that it is most active when taken before a meal, and that in dyspepsia it is to be used after eating. He describes many external uses to which it is adapted; for instance, it relieves headache when it is applied with vinegar to the temples, and its vinous tincture prevents the hair from falling out; it is mixed with honey as a stimulant in ophthalmia, to cleanse ulcers of the mouth and throat, to promote the healing of wounds and sores of the penis, anus, &c. The description of Dioscorides is almost identical with that of Pliny, and Galen does little more than copy it. Mesue states that aloes aggravates piles and inflammations about the anus. Nearly all of the writers mentioned, as well as those of the Arabian school, attribute to aloes a special power of purging off the bile, and curing affections of the abdomen and of the head supposed to depend upon derangement of this secretion. Some of them praise it as a topical application to condylomata and external piles, and in those affections for which Pliny recommends it. Nearly all agree with Mesue in the statement that when taken internally it is apt to create or to aggravate hæmorrhoids, and several insist upon its combination with other laxatives in order to obviate this effect.

ACTION. On Animals.—Experiments on horses, oxen, sheep, swine. and dogs, show that aloes acts upon these animals as a slow but certain cathartic. It is very commonly employed in veterinary medicine. The dose usually given to horses is from five to seven drachms, and it operates in from eighteen to twenty-four hours. Moiroud injected a solution of four drachms of aloes into the veins of a horse, but no purgative effect ensued. The discharge of urine was thought to be increased.

On Man.—Several ancient writers state that aloes acts as a purgative when rubbed upon the skin.2 Wedekind says that an ointment made of aloes and ox-gall and applied by friction, purges. Monro noticed this effect from the application of aloes to a carious ulcer, and others have observed it when it was used to promote the discharge from an issue. Dr. Gerhard, of Philadelphia, found it the medicine best adapted for endermic uses, as its application does not irritate a blistered surface very powerfully. Ten grains of it thus employed produced five or six stools, which were generally accompanied with griping.3 Infants are purged by the milk of nurses who have taken aloes.

In very small doses aloes operates as a gentle stimulant to the stomach and howels, increasing the appetite and promoting digestion. Fallopius states that two grains will cause an evacuation, but only after the lapse of twenty-four hours, and that a scruple is necessary to procure watery dejections. Cullen makes an almost identical statement, and adds that the stools appear to consist merely of what may be supposed to have been present in the large intestines, but that doses of more than twenty grains produce liquid stools, with pain and griping. He regarded the medicine as a mere evacuant of the fæces,

¹ EBN BAITHAR (ed. Sontheimer), ii. 120.

² Murray, Apparat. Med., v. 251.

N. Am. Med. and Surg. Jour., x. 155.

⁴ MURRAY, op. cit., p. 252.

identical in their results with those just given, as to render a detailed account of them unnecessary. He found that one grain doses taken fasting only produced eructations of a peculiar odor, and that two or three grain doses, besides this effect, occasioned after the lapse of eight or ten hours, a soft and copious stool of a brownish-yellow color, and characteristic smell. Larger doses did not appear to increase the effects much; fifteen grains, indeed, produced no discharge at all, and twenty-four grains taken in two doses occasioned two liquid stools on the following day.

The tendency of aloes to produce hæmorrhoids has already been referred to as having been noticed by ancient writers. In times more nearly approaching our own, the same tendency of the medicine has been insisted upon. Fuchsius was of opinion that of one hundred persons who should take aloes frequently as a laxative, ninety would be attacked with piles. Murray blames physicians who are induced by the gentle and certain action of the medicine to expose their patients to so serious a consequence, and Fothergill' reprobates its habitual use in menstrual disorders at the critical period for the same reason. It was to this purgative that Fonseca attributed the prevalence of piles among the inhabitants of Padua, and Stahl makes a similar statement in regard to the people of Hamburg. Calvin is cited as a prominent example of this mischief produced by aloes; for the celebrated reformer is said to have died ultimately from the effects of the piles to which it gave rise; but as he was also of frail constitution, subject to quartan ague, gout, and gravel, the part which aloes bore in his demise may reasonably be judged to have been small. Cullen regarded a belief in the tendency of aloes to produce piles as much exaggerated, and to have been suggested by the effects of large doses of the medicine. He considered the costive habit for which the aloes is given, and not the medicine itself, to be the real cause of the disease. Sachs and Dulk make a very similar statement, and add that they have uniformly failed in establishing hæmorrhoids artificially by its Trousseau and Pidoux arrived at the same result. Brodie's experience confirms these conclusions. He states that from his own observation he could not be certain that aloes is productive of piles at all, and, like Cullen, he attributes this infirmity, not to the medicine, but to the constipation which aloes is used to remove.5

From some experiments made by Dr. Garrod to test the question whether the portion of aloes soluble in water differed in its action from the insoluble, or so-called resinous, constituent, he concluded that the former is a much more energetic purgative than the latter, and contains in itself nearly all the griping property of the drug. The contrast of this result with that obtained by Krahmer in the case of gamboge is not without interest.

Uses.—Trousseau and Pidoux state that aloes was successfully em-

¹ Mangerus, Bibl. Med. Pract., ii. 41. ² Works, ii. 211.

Dict. de Méd. en 60 vol., xx. 505. 4 Handwörterbuch der prakt. Arzneim., i. 223.

<sup>Clinical Lectures on Surgery (Am. ed.), p 308.
Times and Gaz., Feb. 1864, p. 146.</sup>

In imperfection or suppression of the catamenia, without congestion of the pelvic organs, aloes is often useful in restoring the natural condition of the discharge, if taken a few days before the menstrual period. The greater the torpor of the uterine system, the more appropriate does the use of aloes become, and hence it is most applicable to suppression of the menses in females of a phlegmatic temperament, or who are indisposed to nervous or inflammatory disorders. It is not less useful in certain forms of menorrhagia which appear to depend upon debility. Eberle says: "This article, given in small doses, but frequent ones, deserves to be accounted the best remedy we possess for those protracted, exhausting, and obstinate hemorrhages from the uterus which occur in those of relaxed, nervous, and phlegmatic habits, about the critical period of life." This author also employed aloes in conjunction with prussiate of iron, and Dewees used it associated with canella in passive and protracted hemorrhage from the womb. all cases care should be taken to ascertain that the suppression of the catamenia is not the consequence of pregnancy.

It has been proposed by Sandras' to use aloes in the treatment of gleet. He found that it may sometimes be cured, within the space of about a week, by pills of two or three grains of aloes taken three times a day. This method might be tried where special objections

exist to the use of copaiba or of astringent injections.

Aloetic enemata are reported by M. Aran to be remarkably successful in the treatment of uterine leucorrhæa or catarrh, while they fail entirely in effecting analogous discharges from the vaginal mucous membrane, and even from the neck of the uterus. It is, however, a condition of its success that this treatment should not be applied in cases which involve an active inflammatory element. From seventy to one hundred and fifty grains of aloes, and as much Castile soap, are dissolved in three ounces of boiling water. This is administered daily, or every other day, at bedtime, after the use of an injection of tepid water. In the most favorable cases it arrests the discharge in the course of from four to six days.²

The cicatrizing virtues of aloes were, as we have seen, much valued by the ancients, and they have at all times been in the highest popular repute. This is proved by the number of nostrums believed to possess such virtues, and into the composition of which aloes enters, such as Turlington's balsam, Wade's balsam, Friar's balsam, baume du commandeur, &c. The reality of this virtue has been proved by the observations of M. Chaussit on the glycerole of aloes, or a solution of aloes in glycerin. He prepared it by evaporating from four to eight parts of tincture of aloes, and then gradually adding thirty parts of glycerin. He employed it with remarkable success in healing fissures and exceriations of the skin caused by lichen agrius, sycosis of the upper lip and nares, eczema, &c. Five or six applications, at most, sufficed to heal old and obstinate fissures. A solution of one part (by weight) of aloes in two of alcohol has also been found very efficient in the

³ Times and Gaz, Jan. 1858, p. 123.

¹ Bull. de Thérap., xxiv. 16. ² Times and Gaz., Sept. 1858, p. 303.

When croton oil is repeatedly agitated with alcohol of 74 per cent, and allowed to stand, the supernatant alcohol becomes intensely acrid, while the oil itself loses nearly all its acrid taste. If, however, the latter is treated with liquor potassæ, it fully regains this quality, which is supposed to depend partly upon a volatile principle, and

partly upon an acid called crotonic.

HISTORY.—The Arabian writers were the first to notice this medicine, under the name of Dend. They describe several varieties of it. Honain remarks as a wonderful fact that its active principle is oily. He describes its drastic properties, which, he says, render it unsuitable for use in hot climates. Rhazes mentions the violence of its action, and its occasionally fatal effects, and recommends cold affusions to moderate their force. He alludes also to the irritant action of the seeds upon the mouth when they are chewed, and to the eruption which they sometimes produce. He recommends them to be administered in conjunction with milder purgatives. Isa Ben Ali says that Dend purges violently, and excoriates the bowels, and advises to counteract its irritation with an emetic, followed by butter, milk, and mucilages.1 The croton seeds were also described by Acosta,2 under the name of Pignoli di Maluco. He says that they are used by the inhabitants of Malabar, in clysters, as a remedy for sciatica and dysuria, and by the mouth as a purge. He adds that water in which they have been infused cures recent impetiginous eruptions, although it causes much smarting.3 The purgative qualities of the seeds were described by the Dutch naturalist Rumphius, who, about the close of the seventeenth century, lived for many years in Amboyna, one of the Molucca islands. He speaks of the persistent acrid taste of the whole plant, so that chewing a leaf of it causes the mouth and fauces to burn for several days; also of the use of the seeds in the East Indies as a hydragogue cathartic. The writer adds that in Europe the oil is used as a common purge, in the dose of one drop. Hermann alludes to the purgative action of the oil when rubbed upon the abdomen, and Cohausen to the use of the seeds as a remedy for tapeworm. To this statement Murray subjoins that the medicine has gone out of use. Attention was directed to it anew by the publication of Ainslie's Materia Medica of Hindoostan in 1813. The descriptions of the properties and uses of the seeds by the native practitioners correspond very closely with those of the Arabian writers already referred to. They also used the oil as an external application in rheumatism. It was introduced into England in 1820, by Dr. Conwell, who, as well as one or two other East Indian practitioners, published accounts of its operation and uses.

ACTION. On Animals.—The experiments of Landsberg and others upon horses show that these animals are but slowly affected by croton seeds, although the symptoms ultimately developed are severe and even fatal. The most striking of them are these: loss of appetite, frequency

Apparat. Med., iii. 149.

⁴ Herbarium Amboinense, iv. 98.

¹ Еви Вагтная (Sontheimer), i. 427. ² Trattato della Droghe, &c., 1585, p. 238. ³ This author subjoins: "Le buone donne anco di quelle parti, amiche de' loro mariti gliene danno fin quattro per bocca, per mandare i pover' uomini all' altro mondo."

of pulse, debility, signs of abdominal pain, foaming or unusual dryness of the mouth, grinding of the teeth, short, quick, and laborious breathing, flatulent distension of the abdomen, diarrhœa, tenesmus, followed by paralysis of the rectum, cold sweating, and death. The gastrointestinal mucous membrane is found injected and softened, and the bowels are filled with a bloody liquid. In these experiments a dose of from ten to forty of the seeds was given, but the latter quantity only was fatal. Orfila gave a dog three drachms of the seeds, which had been beaten to a paste, and then tied the œsophagus. In threequarters of an hour the animal made strong efforts to vomit, and in an hour and a quarter more lay insensible upon his side. In another hour he was dead. The whole intestinal canal was highly injected. and the mucous membrane of the stomach had a dark red color. Other experiments furnished similar results. When the paste was introduced into the subcutaneous cellular tissue, it produced the same general symptoms, but neither vomiting nor purging, and the intestine was not found inflamed.

In Java the seeds are said by Rumphius to be employed for killing fish.

The action of the oil upon dogs is very speedy and decided. Conwell found that a single drop given to one of these animals produced a discharge from the bowels within forty minutes; twelve drops caused vomiting, and, on the animal being sacrificed, the whole intestinal canal was found inflamed. Five drops injected into a vein produced vomiting, purging, debility, and, in two hours, death. The

gastro-intestinal mucous membrane was highly inflamed.

In three instances, Hertwig injected three or four drops of croton oil into the jugular vein of a horse. Immediately, the respiration became rapid and irregular, the pulse almost imperceptible, the muscles very feeble, and the animal showed signs of pain, followed by apparent insensibility. After half an hour, these symptoms remitted, but in the course of three hours more returned again. Death took place in eight hours without there having been any disturbance of the bowels. On dissection, the alimentary tube presented no alteration, but the heart was spotted with ecchymoses, and the pericardium contained a large quantity of bloody serum. The lungs were also much congested.

The more recent experiments of Bucheim correspond in their results with these. In no instance after injecting croton oil, either pure or from which the free acrid principle had been removed by alcohol, into the veins of an animal, was diarrhoea produced, or inflammation of the intestinal canal excited. Vomiting and the discharge of natural

fæces were observed.2

On Man.—After chewing one of the seeds, which he then spat out, Buchner experienced a prolonged burning pain and constriction of the throat, with sweating of the face. In about an hour afterwards, purging commenced, and eight stools were voided. Lansberg swallowed the half of a croton seed. At first it tasted sweet and oily, but afterwards, and for some time, extremely bitter and acrid; the saliva

WIBHER, Wirkung, &c., ii. 222. VOL. II.—29

² Vinchow's Archiv, xii. i.

flowed abundantly; over the whole body, but especially upon the face there was a sense of heat, and the pulse was quickened; nausea, eructations, distension of the abdomen and colic followed. In two hours and a half the tongue became coated, a sickening taste was perceived in the mouth, and a burning sensation in the fauces. These symptoms continued until the next day, in the course of which three stools were voided; the urine was increased, and had a clouded aspect. several days afterwards there was some degree of debility and malaise, with soreness of the gums. The laborers in the Calcutta Botanical Garden are said to be in the habit of taking one of these seeds as a purgative, and on one occasion the dose is reported to have proved fatal.' The dust of the dried seeds, when inhaled in large quantities, has been known to produce poisonous effects. In a case related by Pereira, the symptoms were loss of appetite, a burning sensation in the nose and mouth, tightness of the chest, copious lachrymation, and epigastric pain. Giddiness and insensibility followed, and then a burning heat in the throat and stomach with numbness and insensibility of the tongue. The bowels were not moved; on the contrary, they required castor oil to open them. Hot brandy and water and the warm bath appeared to relieve the symptoms, which indeed were all, except the epigastric pain, removed in the course of two or three days.

According to Fossati, croton oil given internally in the dose of from half a drop to one drop, will produce fifteen or twenty stools, and that "without the least disturbance or pain." It is seldom that such marked effects are observed from so small a dose. In general, a drop given in emulsion or in pill, produces more or less of an acrid and burning sensation in the fauces and œsophagus, and warmth of the stomach, with nausea and sometimes vomiting. In the course of an hour or two some gurgling and slight colic are perceived in the bowels, followed somewhat suddenly by a watery stool which produces tenesmus: and heat about the anus. Within twenty-four hours, eight or ten more stools follow, and there is little general disturbance of the economy further than considerable weakness. According to Sigmond,* where proper care has been taken, the effects are quite over by the following day, the tongue wears its wonted appearance, there is no fever, no abdominal tenderness or pain, and not unusually the secretions of perspiration and urine have been increased. the oil produces no purgative effect, but, on the other hand, oppression and uneasiness at the epigastrium, general restlessness, violent palpitations of the heart, pains in the limbs and headache, with confusion of ideas, followed by flushes of heat, perspiration and sleep, and a sense of weariness upon the following day. Bucheim maintains that the acrid principle of croton oil is not the only source of its cathartic action, because even where the oil by thorough washing with alcohol is rendered perfectly mild to the taste, and incapable of pustulating the skin, it is still strongly purgative. This effect he attributes to the

PIEDAGERL, Bull. de Thérap., vii. 102.

¹ Pereira, 3d Am. ed., ii. 365.

* Lectures, Lancet, July, 1838, p. 573.

patient. Schneider describes its endermic use as producing alvine evacuations in children. Such effects are very unusual. Andral observed diarrhoea in not more than one out of thirty cases in which he used frictions of this oil upon the skin. The testimony of other observers is nearly the same. The author has been much in the habit of using croton oil to pustulate the skin, but has never met with a case in which it seemed to exert a purgative action. Bucheim introduced nearly five grains of crotonate of potassa under the integument of a cat, and although excessive local inflammation resulted, the bowels of the animal were unaffected. The same dose of the compound having been thrown into the small intestine of a cat, violent bloody diarrhoea speedily came on, and the animal perished. Sometimes when applied by friction to the integument, it fails altogether to produce its characteristic effects. But such examples are rare. In general it brings out, after a few hours, an eruption of minute red pimples, which are always more numerous in proportion to the delicacy and vascularity of the skin, and which gradually are converted into pustules. Some of these have the flattened and umbilicated aspect of the variolous or the tartar emetic eruption, but the greater number are acuminated or rounded. Many of them are apt to be confluent. They are surrounded by a red areola, and accompanied with a more or less severe burning pain and itching. The eruption augments for three or four days, and then remains stationary. Somewhat later, the pustules break in part and form scabs, and in part wither away. If they are numerous and large they become confluent, and form thick and extensive crusts. Between the sixth and twelfth day they separate, and leave no cicatrix behind them.3

Uses.—In obstinate constipation of the bowels and when there exists no contraindication arising from inflammation or structural alteration, croton oil is one of the most appropriate of the purgative class of medicines. It is particularly so when bulky doses are objectionable, and when the patient resists the administration of more ordinary medicines. Of the former description are cases of intestinal obstruction from accumulated fæces produced by simple torpor of the bowels, diseases of the nervous centres, the poison of lead, &c. Of the latter sort are the frequent instances of a refusal to take medicine, among children and insane persons. The oil may in these cases be mixed with milk or soup, and is then generally swallowed unsuspectingly. With the insane, however, the expedient will seldom bear frequent repetition, for they speedily grow suspicious of food which has so unwonted an operation. On account of the smallness of its dose, croton oil has been recommended as a purgative for children whenever they require one of active powers. By carefully proportioning the quantity there need be, it is said, but little fear of its producing injurious effects. But the safer counsel would be to exclude so powerful an agent from the therapeutics of the young, unless in wholly exceptional cases.

This medicine is a very efficient purgative in lead colic. It was

Loc. sup. cit.

³ Andral, Archives Gin., xxviii. 275.

RICHTER, Ausfür. Arzneim., ii. 375.

Corr, Lond. Med. Gaz., July, 1833.

remedy for spinal neuralgia and sciatica, Joret gives it a preference over all other counter-irritants. The inhabitants of Molucca used it for the latter affection. It has also been recommended internally by Mr. Hancock¹ for sciatica, upon the ground that the disease is often produced and maintained by hardened fæces in the colon, and especially in its sigmoid flexure. The results of his treatment appear to sustain this view, but at the same time render it probable that any other active cathartic would be equally effectual by removing the morbid cause. Croton oil is, however, more convenient on account of the facility of its administration, and its thorough operation. In chronic rheumatism croton oil has sometimes been used externally with decided advantage, but it is, on the whole, less useful than stimulant embrocations which do not vesicate, and than plasters of cantharides which do. Chronic inflammations of the laryngeal or bronchial mucous membrane are sometimes greatly mitigated by pustulation of the skin of the throat or chest; for such affections it greatly excels in efficacy the other counter-irritant applications just alluded to.

ADMINISTRATION.—Croton oil may be given in emulsion, or mixed with some other oil, or in pill. Of these forms the last is generally to be preferred. The dose is from one-quarter of a drop to two drops. A safe and convenient mode is the following: Add to two drops of croton oil enough alcohol to dissolve them, and then of bread crumb a sufficient quantity. Make from four to eight pills, of which one

may be taken every hour or two.

The oil may be applied externally by means of a feather, brush, or other convenient instrument, and friction made with a rag until the skin becomes dry. Or it may be mixed with olive or castor oil, or with soap liniment, alcohol, or ether, and applied as before. Or, again, a piece of adhesive plaster may be moistened with it except at the edges, and then applied to the skin. A mixture of one part of croton oil to seven of oil of turpentine is more rapid in its action than the oil alone.

ANTIDOTES.—Milk, olive oil, mucilages, &c., may be given to dilute and envelop the acrid substance; and, when there is a tendency to collapse, opium and alcoholic drinks, and warm stimulating baths should be employed.

HELLEBORUS .- BLACK HELLEBORE.

DESCRIPTION.—This is the root of helleborus niger, a native plant of Auvergne and Burgundy, in France, of Switzerland, Austria, and Greece. It was long regarded as identical with the black hellebore of the ancients. The latter has been shown by Tournefort and Sibthorp to have been more probably *H. officinalis* or orientalis, which abounds in Greece. But as black hellebore is also a native of that country, and as the properties of both species are nearly identical, no practical

¹ Lancet, March, 1854, p. 242 and p. 268; and April, 1855, p. 428.

number of medical historians, expressly names white hellebore as the medicine which cured the king's daughters. Dioscorides states distinctly that the black was the species produced in Anticyra. He attributes to it emmenagogue properties in addition to those enumerated by Pliny, and adds that it is apt to destroy the feetus in utero. Both of these writers, as well as Galen, recommend it for cutaneous eruptions, and as a maturative for the cure of fistulous sores. The Arabian physicians add but little to the above account, but, while dwelling on the valuable cathartic properties of the medicine, insist upon its being dangerous to life, unless duly guarded by diluents,

and the preparation of the system for its use by abstinence.1

ACTION. On Animals.—The ancients had already remarked that hellebore is poisonous to birds and several other animals, but modern experimenters have demonstrated the peculiarities of its action upon quadrupeds, reptiles, insects, &c. They are sufficiently illustrated by its effects upon dogs, horses, cats, &c., as shown in the experiments of Schabel and Orfila.² When its powder is applied to the cellular tissue, it speedily gives evidence, by vomiting, debility, insensibility, &c., of having been absorbed, and at the same time excites some degree of local inflammation. Its constitutional effects upon the higher animals, particularly when given internally, may be thus described. Soon after its administration the breathing grows laborious and slow, the pulse slackens, and in a few minutes a disposition to vomit is apparent, mucus and bile are thrown up, saliva is copiously discharged, and there are signs of abdominal pain. The animal moves with a tottering and feeble gait, has muscular tremors of the hinder and then of the anterior extremities, pants in breathing, and lies powerless upon the ground. At this stage the efforts at vomiting cease; convulsions set in, and from time to time increase, and the animal perishes in tetanic spasms. After death the gall-bladder and ducts are found distended with bile, and a large quantity of this fluid is contained in the small intestines. The liver is often congested; the gastric mucous membrane, that of the small intestine, and, if the animal has long survived, of the rectum also, is inflamed.

On Man.—It is said that hellebore-flowers, when crushed and applied to the skin, produce redness, and even vesication: but neither the root nor the leaves have such an effect. In small doses hellebore appears to stimulate the abdominal organs, augmenting the secretions of the liver and pancreas, quickening the peristaltic movements of the bowels, and augmenting catamenial and hæmorrhoidal discharges. The symptoms produced by an overdose are the following: The digestive organs denote the operation of an acrid irritant, by vomiting, colic, purging, thirst, spasm of the throat, and a burning sensation in this passage and in the stomach. The derangement of the nervous and circulatory systems is shown by convulsions, muscular spasms, anxiety, exhaustion, fainting, delirium, sunken features, a small, feeble pulse, cold sweats, coldness of the extremities, and death by collapse.

¹ Rew Baithar.
² Toxicologie, ii. 454.
³ Dubois, Mat. Méd. Indigéne, p. 367.

ELATERIUM.

DESCRIPTION.—Elaterium is a substance deposited by the juice of the fruit of Momordica Elaterium, or Ecbalium agreste (Richard). This plant is a trailing vine, which grows in Greece and the southern parts of Europe, but is cultivated in more northern countries. Its fruit is a small oblong melon, about one and a half inches long, of a grayish color, and beset with soft prickles. Internally, it is fitted with a succulent tissue containing numerous black seeds, which, when the fruit is ripe, are forcibly expelled where the peduncle is attached to the fruit. From this circumstance it derives the popular name of squirting cucumber, and the specific title Echalium ('extànue, detrudo). expressed juice is allowed to stand until a sediment is formed, which is carefully dried upon a filter and upon porous bricks. This constitutes the elaterium of commerce. It occurs in fragments of a layer about one line in thickness, of a pale greenish or grayish color, and animal odor, an acrid and bitter taste. It forms a greenish tincture by digestion with alcohol. Its active properties are due to elaterin, which exists in elaterium in proportions varying with the purity of the latter. It is white, crystalline, very bitter, but without smell, has a neutral reaction, and dissolves in hot alcohol, but not in water.

HISTORY.—According to Fœsius, elaterium was so commonly used as a purge by the ancients, that the term came to be applied to purgatives in general. Yet in the Hippocratic writings (ed. Littré) it is but twice mentioned as a purge, and without special emphasis. The wild gourds which rendered the pottage poisonous, and whose effects the prophet Elisha prevented by adding meal to the mess, are held to have been elaterium fruits.' Pliny refers chiefly to the external uses of the root, but he, and Dioscorides more particularly, describe minutely the manner of procuring elaterium from the fruit. It is identical with that which is generally supposed to have originated with Dr. Clutterbuck. Dioscorides states that the expressed juice of the root and of the bark is a sovereign cure for dropsy, and the juice of the fruit a valuable cholagogue, but he cautions against the danger of super-purgation by its use.2 Elaterium was highly prized by Sydenham, but seems not to have been generally used until, since the commencement of the present century, it was eulogized by Ferriar as a hydragogue remedy for dropsy, and the proper mode of preparing it was revived by Dr. Clutterbuck.

ACTION. On Animals.—Viborg found that a horse was unaffected by a pound of elaterium fruit, and by two and a half pounds of the root, stalk, and leaves of the plant. The experiments performed on dogs and rabbits have not furnished uniform results. In some cases death has occurred without being preceded by any evacuation whatever, the animal appearing to be suffering severe pain in some instances, and in all to perish by progressive depression. In other

¹ STRUMPF, op. cit., ii. 210.

³ Wibmer, op. cit., iii. 296.

³ Lib. iv. cap. cxlix.

rous and continued until the third day. The subsequent exhaustion was also more complete.'

We are not acquainted with any case of death produced by elaterium or its active principle. One, indeed, is reported of a woman who died from purging produced by two and a half grains of "the extract" and sixteen grains of rhubarb. But neither is the previous condition of the woman mentioned, nor is allowance made for the share of the rhubarb in the result.

Uses.—Elaterium may be used with profit in a great many cases requiring derivation from the head and the evacuation of dropsical effusions. When there is a plethoric condition attended with indications of cerebral or pulmonary oppression, elaterium affords a means of prompt and marked relief, much more so than various other single purgatives or purgative combinations, which are less disagreeable in their operation and also less apt to depress the system. If these grounds of objection do not exist, no evacuant medicine is comparable with this one for the thoroughness of its therapeutic operation.

But it is in dropsy that elaterium has been chiefly and most advantageously used. We need hardly here repeat the remark made elsewhere, that the curability of dropsy depends upon the susceptibility to removal of its cause. There are many cases in which the effusion results from a temporary suspension of the balance between exhalation and absorption, and in which the removal of the fluid constitutes the cure of the disease; and there are many others in which the organic lesion which was the primary cause of the dropsy is in its nature incurable, and therefore the evacuation of the dropsical liquid. by whatever means, can only be regarded as a palliative remedy. Undoubtedly, there are, also, cases in which the extent of organic lesion and its degree of influence are uncertain, and in which a merely evacuant treatment is followed by a complete cure of the dropsy. Hence there is one class of cases in which elaterium may rationally be expected to be curative, and another in which it offers as many grounds of hope as any other remedy of its class.

Sydenham speaks of two medicines which, he says, "bear the bell from all that I have named or know—I mean elaterium and the crocus metallorum. Elaterium, or the fecula of the wild cucumber, acts in very small doses, and acts powerfully, &c." Ferriar declares that "its powers in removing serous accumulations surpass those of any other medicine," while he admits that in certain cases the eventual termination of the organic disease causing the dropsy is thereby only postponed. This writer makes the important remark that after continuing the use of the medicine for several days, the patient will sometimes bear a considerable increase of the dose, so that after beginning with the sixteenth part of a grain of the extract, it may be gradually increased to the extent of five or six grains a day without producing any inconvenience. It is unnecessary to multiply citations in evidence of the anti-hydropic virtues of a medicine whose use has

¹ Lehrbuch der Pharm., p. 353.

Works (Syd. Soc. ed.) ii. 169.

² BECK, Med. Jur.. 10th ed., ii. 677.

⁴ Med Hist., &c., iv 21.

now become so general; suffice it to say that, as a simple hydragogue cathartic, it is incomparably the most certain in its curative effects. Its advantages are peculiarly manifest in the treatment of ascites. In other forms of dropsy, diuretics, saline and vegetable, and especially digitalis, possess superior advantages; but in cases of abdominal dropsy which resist these remedies, as too many will do, a more certain resource is offered by elaterium.

ADMINISTRATION.—The variable strength of elaterium renders it proper to exhibit a minimum dose of it in the first instance. This may be stated at about one-sixteenth of a grain. It may then be rapidly increased until its appropriate operation is established. Elaterin may also be administered in the dose of about one-sixteenth of a grain. If pure, the dose of it should be very cautiously augmented. Either form of the medicine may be prescribed in pill made with conserve of roses and extract of hyoscyamus. Elaterin is most efficacious in solution, as in the formula of Golding Bird: R.—Elaterinæ gr. iv, alcohol fīv; dissolve by a gentle heat. Half a fluidrachm contains one-sixteenth of a grain of elaterin.

PODOPHYLLUM.-MAY-APPLE.

DESCRIPTION.—Podophyllum peltatum, the rhizome of which forms the officinal portion of the plant, is a native of the United States. is perennial, and flourishes most in damp and shady woods, but occasionally is found in dry and exposed situations. The root is long, creeping, brown externally and white within; the leaves, of which there are only two, are large, deeply lobed, and incised, of a yellowishgreen above and lighter below; the flower is placed in the fork of the leaves, and is large, white, somewhat fragrant, and has a recurved peduncle; the fruit is an oval berry about an inch and a half in diameter, of a lemon color, and containing a thick pulp of a sweetish, but rather nauseous flavor. The rhizome, as found in commerce, is in slender brownish pieces, several inches long, jointed, wrinkled, and bearing the remains of the radicles. Its fracture is short and the exposed surface white. The powdered root is grayish. It has a slightly sweetish odor and a bitter, acrid, and nauseous taste. It imparts all its virtues to alcohol, but in part only to water. They depend chiefly upon a resin which is officinally prepared as follows:—

Resina Podophylli.—Resin of May Apple. Podophyllin.

Sixteen troyounces of powdered rhizome of May-apple are deprived, by percolation with alcohol, of its resin, which after reducing the alcohol by distillation to half a pint, is precipitated by water and dried. It is of a color varying from drab to bright yellow. Dose, two grains.

HISTORY.—It is stated, upon the authority of the Rev. F. Hecke-welder, that the American aborigines had been known to use the young shoots of this plant to destroy themselves.' Long before its

^{&#}x27; EBERLE's Therapeutics.

adoption as a medicine by physicians, the root was popularly employed

as a purgative.

ACTION. On Animals.—In the inaugural thesis of Dr. F. H. Snow, quoted by Dr. J. R. Coxe, it is stated that after a decoction of the leaves was administered to a dog, the animal's pulse became weak, copious salivation ensued, and incessant vomiting until death, which resulted within twenty-four hours. Dr. S. R. Percy gave two grains of commercial podophyllin to a dog. Within eight hours it had produced three free alvine evacuations. The same dose was repeated the next day, and it acted on the bowels in three hours, causing, during the day, more than a dozen evacuations. To the same dog one grain of podophyllin dissolved in liquor potassæ was administered by hypodermic injection. It produced great local irritation, free purging in two hours and twenty minutes, evident colicky pains, and much tenesmus, with retching, but no vomiting.1 A series of experiments on dogs, cats, and rats performed by Dr. F. E. Anstie throws a clear light upon the operation of this medicine.* He made use of an alcoholic solution of podophyllin by injecting it into the cavity of the peritoneum. No inflammation of this membrane was excited, and for the intoxicating effects of the alcohol allowance was duly made. As the results were very uniform, a detailed account of one experiment will suffice. Half a fluidrachm of the solution, containing two grains of podophyllin, were thrown into the peritoneal cavity of a full-grown dog. "The animal was not at all discomposed by the operation, and a few minutes after was eating food. Until ten hours afterwards the dog was perfectly lively, and showed no signs of uneasiness. He now commenced retching violently, and brought up only a little mucus. This symptom continued, and was soon accompanied by purging; the stools consisted of glairy mucus; and, after a time, were mixed with blood; the animal whined constantly, and seemed in pain; it also drank water eagerly. Four hours from the commencement of the symptoms, the breathing was shallow and hurried, and the pulse rapid and feeble. At the end of four hours later it was found lying on its side, totally insensible, with glazy eyes, heart's action very slow and weak; respiration consisted of from four to six convulsive gasps per minute. In this state it lay with little change for the next eight hours. At the end of this time a slight general convulsion occurred, and the breathing ceased about two minutes and a half later. The thorax was quickly opened, and the heart was found still beating; it continued to pulsate for five minutes, and its irritability persisted for some time after this. On post-mortem inspection, there was no fluid of any kind in the peritoneal cavity, and the membrane was quite smooth, and polished, and transparent. The kidneys were rather congested, and the liver moderately so; the gall-bladder contained very little bile. The pharynx, œsophagus, and stomach were healthy, except that the stomach contained some bloody fluid evidently brought into it from the intestine by repeated retching. The mucous membrane of the whole small intestine was intensely inflamed, especially

¹ Am. Med. Times, iv. 243.

² Times and Gaz., Mar. 1863, p. 326.

the duodenum is irritated, and particularly when the irritation is of that degree and kind which occasions a copious exhalation of serum and mucus from the lining membrane of the upper part of the small intestine. The conclusion of Dr. Garrod, that resin of podophyllum "often produces actions from the bowels containing abundance of biliary matter, but this is probably more from its causing an emptying of the gall-bladder than from its augmenting the secretion of this fluid," is certainly more correct than the hypothesis which attributes a true cholagogue property to podophyllum. But since the increased discharge of bile may occur without any mechanical compression of the gall-bladder through the act of retching or vomiting, we are disposed to attribute that discharge in part at least to an irritation reflected from the duodenum.

The increased flow of saliva excited by podophyllum has been referred to already. Dr. Gardner met with "two or three cases where it unequivocally produced ptyalism." But Dr. Percy has shown that this effect of the medicine depends upon its nauseant or emetic action, and ceases simultaneously with that action; or else that where this operation does not take place, although the secretion of saliva is augmented, the latter is owing to the direct irritation of the mouth and fauces by the medicine. When it is administered in capsules or in gelatinized pills, no such effect is observed, unless the stomach is irritated to nausea by an excessive dose.

Dr. Percy has shown that the resin, when applied to an ulcer, produces its characteristic purgative effects, together with nausea. He also states that the workmen employed to powder it find it excessively irritating to the eyes, nose, mouth, respiratory organs, and even to the skin, and are frequently sick for several days after performing this work.

The exaggerated and even absurd estimate of the virtues of podophyllum by a class of ignorant persons engaged in the treatment of the sick, has imposed upon the judgment of not a few physicians, and led them to attribute qualities to the medicine which experience has not proved it to possess. Nothing has been added to the original judgment expressed by Dr. Bigelow, and which has already been quoted, to wit, that podophyllum is identical with jalap in its operation, unless we accept as demonstrated the cholagogue virtues which are commonly attributed to the former. In all probability the difference depends less upon an intrinsic diversity in the mode of action of the two purgatives, than upon the more active irritant operation of podophyllum and its concentration upon the upper portion of the small intestine.

Uses.—Like certain other purgatives, podophyllum is reputed to be very efficient in habitual constipation from simple torpor of the bowels, chiefly because it is less disposed than some other cathartics to leave the bowels more torpid than before they were evacuated. Whether this advantage is not too dearly purchased by the nauseating and depressing operation of the medicine, appears not to have been sufficiently considered. As regards the constipation of phthisis, which,

podophyllin can cure cirrhosis of the liver, nor chronic hepatitis, as some have asserted that it can, but in the early stage of either affection it may for a brief period force a discharge of bile and to that extent mitigate the disease. On the whole, we cannot but regard podophyllum and its resin available members of the materia medica, and as worthy to stand on the same line with other drastic purgatives, in spite of its tendency to nauseate and the prostration which it occasions, which it displays in a greater degree than its associated medicines, only because it is more energetic than they.

ADMINISTRATION.—The average dose of powdered podophyllum may be stated at ten grains, but twenty may be given as an active purge. The dose of podophyllin varies a good deal with the variable strength of the preparation, viz., from one-quarter of a grain to three grains. Two grains may be stated as the average dose. One-quarter of a grain will generally act, but not for twelve or more hours. Podophyllin should generally be associated in prescription with extract of hyoscyamus or of belladonna, in order to mitigate its irritant operation. Dr. Percy has proposed to administer the medicine in gelatine capsules covered with mastich varnish. The latter, it is presumed, will not dissolve until it reaches the alkaline secretions contained in the duodenum, and thus the irritating action of the medicine upon the stomach may be avoided.

OLEUM TEREBINTHINÆ, vid. Stimulants. HYDRARGYRUM, "Alteratives.

EXPECTORANTS.

EXPECTORANTS are medicines which directly modify the character

of the bronchial secretions, and promote their discharge.

Evacuant remedies of all the other classes, except anthelmintics, are intended not only to act upon the organs to which they are especially addressed, but also through these to influence other organs neighboring or remote, and to remove or palliate the disorders which exist in them. But expectorants, as their name implies, are addressed to the lungs alone, and even to a single element of the pulmonary apparatus, the mucous membrane of the bronchial tubes. Their application is even more limited still; for it is not every condition of the membrane which these medicines are adapted to cure. They are addressed almost exclusively to that one in which the bronchial secretion is excessive and morbid.

Every mucous membrane, like every other secreting surface, when it is attacked with inflammation, undergoes certain definite changes, which succeed one another in regular order, each one being the proper consequence of that which preceded it. In the first stage, the part becomes a seat of vascular congestion which either momentarily aug-

inflamed, with which they are not brought directly into contact. They may promote expectoration by their influence upon the qualities, and especially the tenacity of the bronchial mucus, but as they do not exert this influence upon the mucous membrane of the lungs more than upon other tissues in other parts of the body which happen to be affected in the same manner, they have no peculiar claim to the title of expectorants.

Again, there are certain medicines upon which it would be equally improper to confer the title of expectorants, although they promote expectoration in a more literal sense than those just referred to. Such are sternutatories, which, by exciting the act of sneezing, assist in discharging the contents of the air-passages. Their action is quite mechanical, and that of emetics differs from it in nothing except that some among them, of the nauseant division, promote at the same time the bronchial in common with all the other secretions of the body. A similar observation is applicable to general stimulants, which, although in states of great physical depression they render expectoration possible, and often become thereby the means of saving life, yet exert no more direct influence upon the lungs than upon any other part of the

economy.

True expectorants are those which appear to have an especial direction towards the bronchial mucous membrane alone, or towards it in common with the mucous membranes of other organs. all stimulants, and the greater number of them contain a resinous element more or less modified by its association with other principles. With such qualities, and such a tendency to the seat of bronchial inflammation, it is evident that if they are administered during the active stage of such inflammation, they must almost of necessity aggravate it, by arresting that process of restoration of which the inflammatory symptoms are the signs, and which, it has before been intimated, is to be palliated by remedies which diminish the vascular engorgement of the affected membrane. If these measures are duly applied in regard to time and degree, and if the patient be of good constitution, they will suffice for his perfect cure; but if, as so constantly happens, the original bronchitis is neglected, or not efficiently treated by the proper remedies, it merges gradually into a chronic form which can only be aggravated by the antiphlogistic measures which at first were As in chronic inflammation of other mucous memappropriate. branes, the bloodvessels remain enlarged, the membrane itself becomes thicker than in health, and from its surface mucus is secreted of various degrees of consistence and shades of color, more or less mixed with a serous liquid, and ultimately containing more or less pus. these circumstances, as in similar conditions of the mucous membrane of the eye, the nasal passages, the fauces, urethra, and vagina, a stimulant treatment is found to be the most successful. It may consist of stimulant vapors directly applied to the diseased surfaces by inhalation, or of stimulant medicines of the class of true expectorants.

As it has been stated in the introduction to this work, the inhalation of medicinal vapors for the cure of bronchial disease is a remedy of ancient date, and their efficacy renders it more than probable that when

to alcohol. They are supposed to depend upon two acids, the polygalic and the virgineic. The latter has only been found by Quevenne.

Polygalin, polygalic acid, or senegin (for it has received all of these names), is a white, pulverulent substance, without smell, and is at first slightly, but afterwards extremely acrid to the taste. It undergoes no change in the air, is slowly soluble in cold water, but dissolves rapidly and completely in boiling water, as well as in alcohol. It is insoluble in ether and the fixed oils. Its watery solution foams greatly when agitated.

The following are officinal preparations of seneka:—

Decoctum Senegæ.—Decoction of Seneka.

A troyounce of bruised seneka in a pint of water is boiled for fifteen minutes, strained, and water added through the strainer, to make the decoction measure a pint. The addition of an ounce of liquorice root masks the acrid taste of the seneka. Dose, a wineglassful three or four times a day. An infusion of seneka may be prepared by macerating six hundred grains of the foot for four hours in a pint of boiling water in a covered vessel, and straining off the liquid. It may be given in the same dose as the decoction.

Syrupus Scillæ Compositus.—Compound Syrup of Squill. Vid. Scilla.

Syrupus Senegæ.—Syrup of Seneka.

This syrup is prepared by extracting the virtues of four troyounces of seneka with two pints of diluted alcohol, in a percolator, evaporating to half a pint, and making a syrup with the addition of fifteen troyounces of sugar. Dose, one or two fluidrachms.

HISTORY.—Seneka was introduced into practice by Dr. Tennent, of Virginia, as an expectorant, and as a specific for the rattlesnake bite, but it has long since lost all claim to the latter distinction. Its efficacy in pulmonary affections was very early appreciated, and it continues to enjoy a high repute in their treatment.

ACTION.—The operation of seneka closely resembles that of squill. Sundelin took a scruple of the powdered root three times within six It produced a smart and unpleasant irritation of the posterior fauces and throat, with a copious flow of saliva. Soon afterwards a decidedly burning sensation was experienced in the stomach, which, after the third dose, was replaced by painful choking and a violent vomiting of thin mucus. The skin, meanwhile, grew moister and warmer. Sharp colic ensued, and a watery diarrhoea. The urine was at the same time augmented, and scalded somewhat when voided. On the following day a painful constriction at the epigastrium was experienced, with loss of appetite. In larger doses seneka excites severe burning pain in the stomach, with violent vomiting, purging, anxiety, and giddiness.1 Sundelin compares it to arnica in its operation on the nervous system, although it excites the secretory functions much more than that medicine. While it stimulates the circulation, it is not heating in its action. From Böcker's experiments, seneka

tions of the conjunctiva, cornea, &c., including those which involve a rheumatic or gouty element.1

ADMINISTRATION.—The dose of powdered seneka is from ten to twenty grains. The dose of the decoction is two fluidounces. The syrup is used as an expectorant in the dose of one fluidrachm.

CIMICIFUGA.

DESCRIPTION.—The root of Cimicifuga racemosa, black snakeroot, or cohosh, a native plant of the United States. It grows in shady and rocky woods. The stem is from three to eight feet high, herbaceous, and somewhat furrowed. The leaves are decomposed; the flowers are white and arranged in a long terminal raceme. When fresh, the root is large, black, and fleshy; as found in the shops, it consists of a black-ish, rough, and contorted body furnished with slender radicles. It is whitish internally, and has a peculiar and disagreeable odor, and a bitter, astringent, and somewhat acrid taste. It yields its specific virtues to alcohol and water, but more perfectly to the former. The resinoid substance obtained by evaporating a strong tincture of cimicifuga has been denominated cimicifugin.

HISTORY.—We are indebted to Dr. Garden, of Wyliesburg, Virginia, for its introduction into medicine, in 1823, but this gentleman states that it was previously in common use as a popular remedy in many parts of the western country.

Extractum Cimicifugæ Fluidum.—FLUID EXTRACT OF CIMICI-FUGA.

Sixteen troyounces of powdered cimicifuga are treated by percolation with a pint and a half of stronger alcohol, and a sufficient quantity of diluted alcohol, to the production of a pint and a half of tincture. This is reduced by spontaneous evaporation to twelve fluidounces. Percolation is then continued with diluted alcohol until two pints more of tincture have been obtained, which are reduced by evaporation to four fluidounces and added to the tincture first obtained. The whole is then filtered. *Dose*, fifteen to twenty minims.

ACTION.—Dr. Chapman's says that "given so as to affect the system, we find, first, some nausea, followed by greater freedom of expectoration and more or less relaxation of the surface, with slight nervous tremors, and vertiginous affections. The pulse, during this state, is considerably lowered, and is apt to remain so for some time." This statement is essentially confirmed by Dr. Davis, the most recent writer upon the subject, who says: "In large doses it produces vertigo, dimness of vision, and a depression of the pulse, which continues for some time." In medicinal doses, Dr. Young' did not find it either to vomit or purge, nor yet to increase the perspiration or the urine, nor did it affect the pulse, but produced only an uneasy feeling amounting to an ache through all the extremities, and lasting from one

STRUMPF, Handbuch, ii. 118. * Med. Recorder, vi. 609.

^{*} Elem. of Therareutics, 6th ed. (1831), i. 357.

more perfectly than to water. Hence it should generally be used in the form of a fluid extract, or in substance pulverized. (Davis.) In acute rheumatism, from fifteen to twenty minims of the fluid extract, or twenty grains of the powder, may be given to an adult every two hours until its effects are manifested. A decoction may be prepared by boiling for a short time an ounce of the bruised root in a pint of water. One or two fluidounces may be given for a dose.

ALLIUM.—GARLIC.

DESCRIPTION.—The officinal article is the bulb of A. sativum. Under this head may be included all the species of the genus Allium, of which there are said to be more than one hundred and sixty.¹ They abound in almost every part of the world, but A. sativum, or garlic, A. cepa, or onion, and A. porrum, or leek, which are most commonly in use, especially for culinary purposes, are not indigenous to this country. The bulb is the part employed in the kitchen and in the laboratory. In garlic it is composed of prismatic segments called cloves, but in the onion and leek it is tunicated.

These plants contain a strong volatile principle on which their acrid taste depends, and a peculiar penetrating odor, termed alliaceous, which is apt to excite a flow of tears. When the juice of garlic is applied to the skin, it acts as a rubefacient, and even as a vesicant, in virtue of this principle. It is wholly driven off by boiling, which renders the bulb mild and somewhat sweetish to the taste. Wertheim describes the ethereal oil of garlic as producing, when rubbed upon the skin, severe pain and inflammation.

Syrupus Allii.—Syrup of Garlic.

This preparation is made by macerating six troyounces of fresh garlic with a pint of diluted acetic acid. filtering the liquor, and converting it into a syrup with two pounds of sugar. Dose, for a child a year old, a teaspoonful.

HISTORY.—Several species of allium, and especially those already named, have been known from a high antiquity. They are mentioned by Hippocrates, and Pliny treats of them separately and fully. By these and subsequent writers all of the qualities are fully described which modern observation has detected in them. Dioscorides states that fresh onions are stronger than such as have been kept, or have been prepared with vinegar and salt. They are, he says, biting, carminative, appetizing, and attenuating; they excite thirst, produce nausea and vomiting, and loosen the bowels. Of garlic he adds that it is a rubefacient, stimulant, and diuretic. Several ancient writers state that the juice of these plants clears the sight and removes opacities of the cornea and granulations of the conjunctiva; that ointments into which it enters cure alopecia and various chronic eruptions of the skin, form an excellent stimulant dressing for excoriations, and relieve deafness and singing of the ears when instilled into the auditory canal.

as a vermifuge, and it has even been found successful in expelling Clysters of milk containing the juice of garlic, and also the vapors of garlic introduced into the rectum through a funnel, have been used to destroy ascarides, but are somewhat objectionable on account of their offensive smell. Onions have been used successfully to procure the evacuation of dropsical effusions, and particularly of anasarca produced by cold. Sydenham and Cullen both recommended garlic as a remedy for dropsy. Cases of excessive anasarca are reported by M. Claudot' in which the patients were restricted to a diet of bread and milk with onions, both raw and cooked. Copious diuresis followed, and a perfect cure.

Syrup of garlic, or the domestic onion syrup, is one of the most generally used of all the expectorant remedies, particularly with children. It should not be administered during the febrile stage; but when this is past, it contributes materially to the resolution of the attack. In the chronic forms of infantile and also of senile catarrh it will be found a useful medicine. Cazin reports that in epidemic pseudo-mêmbranous angina or diphtheria, he found a local application of lemonjuice and garlic-juice, with the internal administration of one part of this mixture to three of syrup of hyssop and one of gum syrup, a very

efficient remedy.3

Externally, a cataplasm of bruised garlic is often applied to the chest or throat in catarrhal and other inflammations of these parts. Anciently it was used as a revulsive to the feet in affections of the head. The juice, mixed with oil or spirits, is a popular embrocation in convulsions, whooping-cough, and other nervous disorders among children. A clove of roasted garlic, or a pledget of wool saturated with garlicjuice, is a good stimulant application to the auditory canal in deafness produced by cold. In abscess of the ear, the central portion of a roasted onion introduced into this tube forms a convenient and admirably soothing application. Roasted onion may be of use as a poultice to the perineum in strangury and other irritations of the bladder, and bruised garlic in atony of this organ.

Administration.—The modes of employing the alliaceous vegetables have been chiefly indicated in the course of this article. Cloves of garlic may be given in substance, after having been cut into small pieces, or the expressed juice administered with milk or sugar, in the dose of half a fluidrachm. Of the syrup a teaspoonful may be

given to a child one year old.

* Bull. de lh.rap., xlv. 363.

AMMONIACUM. -- AMMONIAC.

DESCRIPTION.—Ammoniac is the concrete juice of Dorema Ammoniacum, a plant which grows in Southern Persia, between Ispahan and Shiraz, in warm, sunny localities, and in dry and stony soils. The sap, which is very abundant, exudes from small punctures made in the

BBERLE says (Thérap., p. 417): "I have known it to be given with decided advantage for the purpose." Bull. de Thérap., lv. 327.

abdomen, as infarction, torpor, &c., of the lymphatics and portal circulation, and in dropsy depending upon these conditions. So far as it is possible to conjecture, the states corresponding to these descriptions constitute organic diseases of the liver, spleen, mesentery, uterus, ovaries, &c., in which it is evident that ammoniac can be of no avail whatever. Indeed, this is rendered certain by the medicine having been in every instance combined, by those who prescribed it, with purgatives, diuretics, mercurials, and other alteratives, to which alone whatever benefit followed its use can be attributed.

Externally, plasters of ammoniac operate as discutients in chronic rheumatism, white swelling, and other chronic affections of the joints, as well as in cold abscesses and subcutaneous effusions of blood, and indolent tumors generally.

ADMINISTRATION.—Ammoniac may be given in pill, but is preferable in emulsion. From ten to thirty grains may be taken at a dose. Several plasters containing ammoniac, besides the *Emplastrum Ammoniaci*, are officinal; one of the most efficient is the *Emplastrum Ammoniaci cum Hydrargyro*, which is much employed as a discutient. The mercury which it contains sometimes affects the gums.

MYRRHA.—MYRRH.

DESCRIPTION.—Notwithstanding the ancient and general use of myrrh, the plant from which it is procured remained undescribed until within a few years, when an account of it was furnished by Ehrenberg and Hemprich, under the title of Balsamodendron Myrrha. This is a thorny shrub which grows in Arabia Felix, Upper Egypt, Nubia, and Abyssinia. A juice exudes from its surface, which at first is thin and of a light-yellow color, but subsequently concretes and acquires a darker and reddish hue.

Myrrh has a strong, pleasant, aromatic, and peculiar odor; its taste is warm, aromatic, bitter, and somewhat acrid. It grows soft by chewing, and is ultimately dissolved by the saliva. It is readily inflammable, and is partially soluble in water, rendering the fluid milky. Alcohol and ether dissolve its resinous portions only. Alkaline solutions dissolve it very well, but not so completely, it is said, as may be done by triturating it with four parts of hydrochlorate of ammonia and one hundred and sixty of water. The difficulty of dissolving myrrh arises from its containing, besides ordinary gum and resin, a volatile oil and a gum insoluble in water.

Myrrh enters into the composition of several officinal preparations described in other articles, viz., Compound Mixture of Iron, Pills of Aloes and Myrrh, Compound Pills of Iron, Compound Pills of Galbanum, and Compound Pills of Rhubarb.

Tincture Myrrhæ.—Tincture of Myrrh.

It is prepared by percolation with alcohol from three troyounces of powdered myrrh so as to obtain two pints of tincture. It is hardly ever used internally, but may be prescribed in doses of half a fluidrachm.

tions, with which it may be advantageously associated, or with tonic expectorants, such as Iceland moss, or with preparations of cinchona, iron, and other pure tonics. The celebrated Griffith's mixture (Mistura Ferri Composita), which contains both myrrh and iron, owes its efficacy in chronic catarrhs to these ingredients. Chronic mucous fluxes of the digestive and urinary organs, when once the inflammatory element has disappeared, are favorably influenced by myrrh, alone or in combination with astringents. Like all excitants, however, it must be used in these diseases with great circumspection. Amenorrhæa and scanty menstruation, when they depend upon a cold, relaxed, and torpid state of the system, are benefited by myrrh, especially when in combination with iron, as in Griffith's mixture.

The external applications of myrrh are not unimportant. It has been recommended as a dressing for wounds that are slow of healing, when the granulations are pale and flabby and the pus is of an ichorous nature, for those in which the discharges are offensive, and for all the morbid conditions that denote a feeble recuperative action in ulcerated surfaces. One of its most familiar uses is to remedy the softened and swollen condition of the gums which is apt to accompany dyspepsia and scorbutic affections. In such cases the repeated use of a mixture of tincture of myrrh with water (f3j to f3vj) tends to strengthen the gums and promote their healing, while it corrects the offensive odor of the breath.

ADMINISTRATION AND DOSE.—Myrrh may be given in substance, in pill, or powder, and in doses of from five to fifteen or even thirty grains. The emulsion may be conveniently administered as an enema. The tincture is seldom prescribed internally, but is of common use as a mouth-wash and gargle.

BALSAMUM PERUVIANUM .- BALSAM OF PERU.

DESCRIPTION.—The juice of Myrospermum Peruiferum, a tree "which grows in Central America, in the State of St. Salvador, upon the Pacific coast."

It is of a deep reddish-brown color, resembles honey in consistence, and has a very fragrant smell, which has been compared to that of vanilla and benzoin, and which is rendered more powerful by heat. Its taste is warm and bitter, and it leaves an acrid sensation in the fauces. On burning, it gives off a dense white smoke. Its principal constituents are resin, a peculiar oil, and cinnamic acid.

Action.—Balsam of Peru is a general stimulant, but acts most decidedly upon the mucous membranes. According to Mitscherlich, it promotes digestion, but in large quantities excites heat and oppression in the stomach, nausea, vomiting, colic, and diarrhoea. In full medicinal doses, and long continued, it occasions some degree of general excitement and warmth, renders the pulse more frequent, and augments the secretions of the skin and kidneys. In common with

after dysentery mucous dejections and tenesmus persist. In flatulent and colicky affections of the intestinal canal, with a disposition to nausea and vomiting, this balsam may be used with great benefit if associated with tonics and stimulants.

In gonorrhæa it is inferior to copaiba, but after purgation it is sufficient, according to Hoffmann, to accomplish the cure of both mild and malignant gonorrhæa. It may also be used advantageously in leucorrhæa if associated with bark and iron.

It is said to have been successfully employed in convulsions produced by suppressed perspiration, and even in those of a tetanic form.¹ Such is also the assertion of Dr. Kollock, of Savannah, who used it both internally and externally, and found that of itself it "restored the patient when rapidly sinking under the very liberal use of opium, wine, and bark." The maximum dose given by this physician was one hundred and twenty grains in twenty-four hours. In these cases it must be suspected that the balsam had but little to do with the cure, apart from its stimulant action, which co-operated with that of the wine.

Externally, balsam of Peru has been much employed to promote the healing of wounds in parts of inferior vitality, and in phagedenic and indolent ulcers. In ulceration of the nipples, the following preparation will be found useful: R.—Balsam. Peru. gr. cxx; ol. amygdal. gr. xc; gummi Arab. gr. cxx; aqu. rosæ f3j.—M. S.—Apply five or six times daily. Or, simply, sixty grains of balsam of Peru to one hundred and twenty grains of glycerin ointment. If pain is then excited, the proportion of balsam may be diminished. A liniment containing some astringent substance with the balsam of Peru, is an excellent application to parts discharging offensive pus, such as the ears, the nose, the vagina, &c. A plaster composed of diachylum, opium, and Peruvian balsam is recommended as a palliative for chilblains.

Internally, the dose is half a fluidrachm, which may be given in emulsion of almonds, gum Arabic, or the yolk of eggs, with the addition of sugar. Balsam of Peru is an ingredient of the compound tincture of benzoin.

BALSAMUM TOLUTANUM.—BALSAM OF TOLU.

Description.—This substance is the concrete juice of Myrospermum Toluiferum, a tree which grows upon the mountains of Tolu, and in other districts of South America and Mexico. It is procured by making incisions in the bark. When fresh, it is soft and tenacious, but it becomes hard and brittle by age. It is yellowish, transparent, and fragrant; it softens under the heat of the hand, and has a pleasant, sweetish, and aromatic taste. It readily inflames, and diffuses an agreeable odor. It is soluble in alcohol, ether, and the volatile and fatty oils. It contains resin, a volatile oil, and cinnamic acid.

The officinal preparations of Tolu are:—

RICHTER, Ausferlich, Arzneim., ii. 85.

Tinctura Benzoini Composita.—Compound Tincture of Benzoin. This is a filtered solution of three troyounces of benzoin, half a troyounce of socotrine aloes, two troyounces of storax, and a troyounce of balsam of Tolu in two pints of alcohol. Dose, half a fluidrachm.

Unguentum Benzoini.—Ointment of Benzoin.

It is made by heating together a troyounce of powdered benzoin and sixteen troyounces of lard.

ACTION.—We possess no accurate experimental knowledge of the operation of benzoin upon the human economy. It is generally said . to have little or no influence upon the digestion, but in large doses to quicken the circulation and increase the urine and the exhalation of the skin. These properties are usually attributed to the benzoic acid which it contains; but, however true this may be of its action upon the urine, we must rather atribute its efficacy in pulmonary diseases to the resinous element. Pure benzoic acid, when slightly warmed, exhales an aromatic fragrance. Schreiber' took half an ounce of it in forty doses in the course of two days. He experienced a prolonged irritation of the throat and a sense of warmth, first in the abdomen and then over the whole body. The pulse grew more frequent, and afterwards subsided gradually. After the first day, the perspiration and expectoration were augmented, but the quantity of urine was unchanged; the head was somewhat confused, and the digestion was temporarily impaired. According to Dr. Ure, the administration of benzoic acid causes the disappearance of uric acid from the urine which is replaced by hippuric acid. Similar statements have been made by Leroy d'Etiolles and by Debouy. Keller, on the other hand, maintains that the uric acid remains unchanged, and that the benzoic acid is converted into hippuric acid's at the expense, according to Garrod, of the urea, the uric acid meanwhile remaining undiminished.

Uses.—The principal use of benzoic acid is to diminish the tendency to the formation of uric acid calculus. In spite of the theoretical views above stated, experience has proved that this object may be, partially at least, secured, and the effects of the disease palliated. Upon this ground it was recommended by Golding Bird to be administered in doses of eight or ten grains in syrup, or dissolved in a weak solution of carbonate or phosphate of soda, thrice a day. namon-water forms an appropriate vehicle.5 Dr. Ure announced, in 1844,6 that from ten to twenty grains of benzoic acid, given twice a day, in cases of phosphatic urine, is capable of rendering the urine acid, and thus preventing the irritation of the vesical mucous membrane, which is so distressing a symptom of that form of disease.

¹ Mitscherlich, ii. 223.

² Dieu, iv. 911. ⁸ Mitscherlich, loc. cit. ⁴ Lancet, Nov. 1844, p. 240.

⁵ The following is Dr. Bird's formula: R.—Sodæ carb. 3iss; acid. benzoic. 3ij; sodæ phosph. Ziij; aqu. ferv. fZiv; solve et adde aquæ cinnamomi fZviiss; tinct. hyoscyami fziv.—M. S.—Two tablespoonfuls three times a day.

PRAGER Vierteljahrschrift, ii. 139. ⁷ A striking case of the efficacy of this treatment is contained in the Lancet, Nov. 1863, p. 591.

acid is about the same. To promote its solution in water, four parts of phosphate of soda, or one part and a half of borate of soda, may be added.

PIX LIQUIDA.—TAR.

DESCRIPTION.—Tar is the impure turpentine procured by burning from the wood of *Pinus palustris* and other species of Pinus. It is a blackish-brown, tenacious, stringy semi-solid, possessing a strong empyreumatic odor, and a nauseous, acrid, bitter, persistent, and somewhat acid taste. It is but slightly soluble in water, in which it sinks, but it readily dissolves in alcohol, ether, and oils. It is very inflammable, and in burning emits a dark thick smoke. "It consists of resinous matter united with acetic acid, oil of turpentine, and various volatile empyreumatic oils, and is colored with charcoal." Among the oils is creasote.

Unguentum Picis Liquidæ.—TAR OINTMENT.

This ointment is prepared by stirring together equal parts of melted tar and suet.

HISTORY.—In the Hippocratic writings, tar is spoken of as a dressing for sores, and as a medicine in certain affections of the womb. Pliny describes it as stimulating and healing, and as useful in catarrhs and chronic coughs and various nervous affections when taken internally. Externally, he states that it cures papular eruptions, and the itch of dogs and cattle, heals indolent ulcers, promotes the cure of carbunculous and sloughing sores, of fissures of the anus and of the nipples, and that it is also a remedy for alopecia. Similar virtues are attributed to it by Dioscorides. Other ancient writers, including Galen, repeat the same account.

For a long time this remedy would seem to have fallen into disuse among physicians. Yet it continued to be employed as a popular remedy for man and beast. More than a century ago Bishop Berkeley · published his treatise on the wonderful virtues of tar-water,3 a work in which there is more of all things else than of its nominal theme. The learned writer would seem to have learned something of the popular uses of tar-water during his sojourn in America, but he subsequently attributed to it, as the result of his own observation, all the virtues of a panacea. He alleged it to be stomachic, cardiac, diaphoretic, diuretic, alterative, pectoral, antihysterical, &c., and to be of great use in gout, gangrene, fevers, peripneumonies, pleurisies, erysipelas, scurvy, chronic dysenteries, urinary disorders, and hypochondriasis. To impute such extravagant virtues to any remedy is absurd. case of the learned and acute author of the Minute Philosopher, it can be explained only by supposing that he craved a faith in something, however preposterous, in order to atone for his denial of what the rest

¹ Hist. Nat., xxiv. 23, 24.

² Lib. i. cap. xxviii.

³ Siris, A Chain of Philosophical Reflections and Inquiries concerning the Virtues of Tar-Water, &c., 2d ed., 1744.

Diseases of the Skin.—In 1834, Duchesne-Duparc and Dauvergne used an ointment of two drachms of tar to an ounce of lard, in treating scabies. It relieved the itching promptly, seldom produced accidental eruptions, and cured the disease within ten days.¹ In the Berlin hospital, Fricke used it successfully in 264 cases, two-thirds of which were cured within a fortnight. But the method was not persevered in because many relapses were observed to follow its employment, and because it involved the destruction of the bed and body clothing used by the patients.²

In scaly eruptions, and particularly in psoriasis, this remedy was greatly vaunted by Emery,³ who says: "Before I used this powerful method, I never knew, in treating a severe case of psoriasis, whether it would get well, nor when; now I can confidently declare that hardly a case of lichenoid eruption or of psoriasis resists the due application of tar ointment." In support of this statement, Emery claimed more than seven hundred successful cases. He used an ointment containing one part of tar to four of lard, and applied it three times a day. The ordinary duration of the treatment was four or six weeks, but in some severe and inveterate cases it extended to two or three months. It cannot, however, be denied that the permanence of the cure by this treatment appears to be less than when arsenical preparations are employed. The union of both plans is indicated whenever either one singly proves ineffectual.

In some cases of eczema of long standing, when all secretion has ceased, and the skin has become thickened, rough and scaly, tar ointment, or oil of tar, will act more favorably than perhaps all other applications, provided that its strength be cautiously proportioned to the sensibility of the skin. Herpes circinatus (ringworm) is often readily cured by tar ointment, as well as by an analogous preparation, the oil formed by condensing the smoke of burning paper. According to Trousseau, tar ointment is one of the most used and useful remedies

for prurigo.

Tar is used by the vulgar as a dressing for excoriations both of man and beast. It is also a popular application to scorbutic and gangrenous sores. In unhealthy ulcers, says Vogt, tar ointment deserves to be preferred, for it is not easy to accomplish so much with any other dressing. It has been used with prompt success to heal mercurial ulcers of the gums and throat, both by painting them with tar itself, and by using a mouth-wash of tar-water. The ancient practice of treating fissures of the nipples and hæmorrhoids with preparations of tar, has been successfully revived by Jaffé and Marcus.

The deodorizing property of tar renders it an appropriate dressing for gangrenous sores, and its emanations may be used for purifying the air of sick chambers.

ADMINISTRATION.—Tar may be given mixed with milk or with beer, or else in pills. From sixty grains to half an ounce may be taken daily. "Tar-water is prepared by stirring a pint of tar with

MERAT and DE LENS, Dict., tom. suppl. p. 697.

¹ Bull. de Thérap., vi. 144.

² STRUMPF, Handbuch, i. 920.

Bull. de Thérap., xi. 216; xiii. 72.

4 Dévergie, Mal. de la Peau, p. 513.

considered certain that the skin is a principal outlet of effete matters derived from various and probably many organs, and which become causes of disease when retained in the blood. Of this fact, indeed, there is the direct evidence of the senses, when, in disease, the perspiration acquires sour or fetid odors, when we observe it to exhale the smell of garlic, musk, amber, assafcetida, &c., and when we see that it becomes glutinous or greasy, and that occasionally even its color is altered to yellow, blue, red, green, &c. These facts suggest a partial explanation of the circumstance that all perspirations are far from having the same influence upon disease; and that while some coincide with a marked amelioration of the symptoms, others exert no influence upon its course, or appear only to aggravate it by inducing debility.

The influence of perspiration upon the temperature of the body is one of its most important modes of action. It is by this, indeed, that the animal heat is maintained constantly at very nearly the same degree; for the more active does the generation of caloric become, the more copiously is this principle evolved from the cutaneous surface, carrying with it a large proportion of moisture. But in febrile diseases, while the temperature of the body is raised by the activity of the destructive processes going on in the economy, the cutaneous exhalation is diminished, according to the old expression by "a spasm of the capillary vessels of the skin," and the sensation of heat in this texture, as well as in the internal organs, becomes a source of much suffering. The subsidence of the excitement and tension is usually accompanied with more or less perspiration. The occurrence of such a discharge has generally been looked upon as the cause of the relief which is then experienced. But although the elimination of morbid matter which probably takes place through the skin, and visibly by the urine at the same time, may tend to bring the febrile attack to a termination, it cannot be overlooked that the very occurrence of diaphoresis demonstrates that some salutary change within the economy has preceded it, and that this change, therefore, and not the perspiration itself, is the true cause of the amelioration of the symptoms. The amount of the exhalation from the skin is not proportioned to the relief which accompanies it, and, indeed, in several febrile diseases, bears to it an inverse proportion. In typhus fever, articular rheumatism, and hectic fever, for example, the discharge of liquid from the skin is frequently profuse, and yet, far from alleviating the febrile symptoms, it only renders them less tolerable. It may be suggested that in these and similar cases, the liquid which is poured out by the skin so copiously, contains none of the morbid elements which sustain the disease. This may be perhaps admitted as a general proposition; and yet we observe that in rheumatism the secretion is continuously and strongly acid, without at all alleviating the suffering of which, in the opinion of many, acidity is a cause. When, therefore, the symptoms of a febrile disease subside during the occurrence of diaphoresis, we may presume that the two phenomena are effects of a common cause, and that either they precede the other in the order of their appearance, or take place independently.

It is not uninteresting to observe that the ancient physicians fully

to explain why this should be, or to decide whether it is owing to a mechanical distension of the capillaries which paralyzes their movements, or whether there is really a spasmodic contraction of those unstriped fibres in which the skin abounds, and which thus prevent the exit of fluids from the bloodvessels. The former of these suppositions, as an exclusive explanation, is the more probable of the two; for were it true that the contractile element of the skin was in a state of spasm merely, the tissue ought to be comparatively pale, as we see that the scrotum is when the dartos muscle is corrugated. The skin being, on the contrary, more highly colored than natural, we must in this case adopt rather the alternative supposition. It is also more in harmony with the observed effects of diaphoretic medicines. In febrile affections with a dry skin, perspiration may be produced by stimulant or by sedative diaphoretics, but not by either indifferently. The propriety of a choice between them will depend in a great measure upon the stage of the disease. While it is still in embryo, as it were, and before its material elements have acquired the fixity of a new form, they may be dispersed by the application to them of a sudden and lively force. Thus it is that at the commencement of fevers and inflammations a stimulant diaphoretic not unfrequently prevents the further development of the attack, scattering their gathered elements, and eliminating them with the perspiration. But when once the vascular engorgement has exceeded that limit beyond which the vessels refuse to contract under the action of such stimulants, and possibly are thrown into a spasmodic state, it is evident that stimulant medicines must only tend to aggravate the mischief, and, so to speak, impact the blood more firmly in the capillary vessels. Sedatives of the nervous and circulatory system, upon the other hand, must tend to promote diaphoresis—first, and possibly, by relaxing the supposed spasm of the vessels or of the skin; but secondly and more certainly by lowering the action of the heart and arteries, allowing the blood to retreat from the capillaries, and consequently permitting its more fluid parts to escape as perspiration. Thus, according to the condition of the skin and of the system in general, a stimulant or a sedative may be the most appropriate agent for the production of diaphoresis. In the one case the circulation must be excited in order to cause the bloodvessels to discharge their more liquid contents through the pores of the skin; in the other it must be depressed, in order to render the escape of fluid possible from the engorged bloodvessels. Familiar illustrations of the former have already been referred to in the various dietetic and calorific agents, including hot drinks; of which it may be further remarked, that the rapid accession of a large quantity of liquid to the bloodvessels, by absorption from the stomach, must tend to excite diaphoresis whenever the general temperature of the body does not greatly exceed its normal average, even independently of the caloric with which it is combined; but its union with heat gives it a special direction to the skin when it would otherwise tend to escape by the bowels or by the kidneys. When, on the other hand, the skin is abnormally hot and dry, it is more quickly rendered perspirable by draughts of cold than of warm liquids. This fact is familiarly

latter a distinctly stimulant influence is perceptible, followed, however, by sedation and profuse perspiration. Indeed, the more the action of this group of powerful diaphoretics is examined, the more probable does it appear that their peculiar effects are due to their producing successively, but in close succession, stimulation and sedation.

The therapeutical management of diaphoretics requires a great deal of circumspection. It may be held to be law, to the application of which there are very few exceptions indeed, that powerful and stimulant sudorifics are useful only in the forming stage of acute febrile diseases. All of those which originate in the impression of cold upon the surface of the body, affections of the throat, lungs, and skin, especially, and even of the bowels, may generally be arrested in their development by almost any agency which will excite a copious discharge of perspiration; by hot stimulating vegetable infusions, for example, in the case of the first-mentioned disorders, and by opium, or, still better, by Dover's powder, in these, and more particularly in the last. Nor is such an impression upon the economy much less efficient in the forming stage of miasmatic fevers, for it often prevents the further progress of the disease, especially if conjoined with the use of an emetic, and followed by a full dose of opium. It is this striking and salutary result of the treatment that has lent a powerful support to the doctrine that it becomes curative by eliminating a morbid poison derived either from the suppressed perspiration or received into the system through the lungs. A similar remark applies to many cases of uræmia, cholæmia, poisoning by venomous animals, and by mineral poisons, especially lead; although it must be admitted that, except in the third of these examples, diuretic medicines are more efficient than diaphoretics.

In certain chronic diseases, such as rheumatism, gout, skin diseases, syphilis, scrofula, &c., the energetic appliances of the water-cure are sometimes attended with remarkable success, when they have produced copious diaphoresis, and the body is, as it were, purged through the skin by the simultaneous administration of cold water.

It was an ancient practice to attempt the cure of dropsy by covering the patient with hot sand, and the same method has been employed in our own time for the relief or cure of anasarca. The unusual dryness of the skin in diabetes no doubt suggested a similar method of treating that affection, and of using opium, which, while it promotes the action of the skin, restrains that of the kidneys.

But if the utility of diaphoretic medicines is unquestionable in many chronic diseases and at the commencement of the greater number of acute affections, their application to fully-developed febrile disorders, whether idiopathic or symptomatic, is subjected to different rules. These affections, when once formed, involve a more or less radical change in the condition of the nutritive functions, which, as it has required time for development, requires it also for a cure. Of all the benefits conferred upon medicine by pathological anatomy, none exceeds in value its demonstration that the greater number of diseases are associated with, and often dependent upon, physical changes,

Preparation and Properties.—This solution is prepared by saturating diluted acetic acid with carbonate of ammonia. It is a colorless, transparent, and inodorous liquid, of a sweetish saline taste, and readily decomposes by keeping. It has a sp. gr. of 1.011, and is, therefore, less concentrated than the French and German preparations, the former of which has a sp. gr. of 1.036, and the latter of 1.035, and contains fifteen per cent. of the pure acetate, and also acts sensibly upon the living tissues, dissolving the cuticle and the epithelium of the gastro-intestinal mucous membrane. The solid crystallized acetate of ammonia may be obtained by evaporating the saturated solution in an air-pump over sulphuric acid. This salt readily deliquesces.

ACTION. On Animals.—Mitscherlich' injected into the stomach of a rabbit half an ounce of the solution (Pharm. Bor.). It occasioned no decided symptoms. But when an ounce was used great prostration ensued, hurried breathing, frequent pulse, inability to stand up, with alternate rigidity and spasms, and death within two hours; no fæcal discharge took place; the epithelium of the stomach and small intestine was found dissolved. In another experiment, half an ounce of the solution was twice injected into the cellular tissue of the abdominal walls of a rabbit. The animal uttered loud cries and struggled, then grew feeble, and lay first upon the belly and then upon the side; spasms and tetanus followed, and death took place in an hour and ten minutes. On inspection, the wound was found to be full of bloody serum, and the bloodvessels around were distended with slightly coagulated blood. The epithelium of the upper portion of the intestine appeared to be thinned and covered with more mucus than usual. These experiments show that the preparation is far from being inoperative.

On Man.—Cullen put forth the singular opinion that this medicine is valueless. He had "never seen any benefit from it," and had "known four ounces taken at once, and soon after four ounces more without any sensible effect." Many other writers make an opposite statement. Voigtel says that it acts as a general but mild and transient stimulant, with a special direction to the skin and kidneys. Richter found it to be most valuable for its diaphoretic properties. He states that it renders the pulse somewhat fuller and more frequent, and augments the general activity and warmth of the skin, until sweat breaks out, when these symptoms decline, and coolness and relaxation succeed. He adds that, when it does not act upon the skin, it augments the secretion of the lungs and the kidneys. In large and repeated doses it disturbs the digestion, and provokes diarrhea. According to Mérat and De Lens, its stimulant properties are incontestable. Patin found that it produced a transient giddiness and intoxication.

The preceding conclusions were drawn from observing the action of the remedy in disease. They do not agree with the results of experiments on healthy persons. Thus, Wibmer observed no effects in his own person except some irritation of the fauces, a little warmth

Lehrbuch, ii. 294.

Arzneimittellehre, iv. 527.

⁶ Mat. Med., i. 243.

² Mat. Med., ii. 347.

Ausfurl. Arzneim., iv. 337.

Archives Gén., xviii. 231.

medicine's utility in any form of dysmenorrhæa. That it is so may be considered probable.

Various writers have recommended the spirit of mindererus in dropsy depending upon atony of the skin and kidneys, and in particular in the form which occurs after scarlatina and measles. Dr. Todd

also has advised it in "inflammatory dropsy."

In many other diseases acetate of ammonia has been alleged to be serviceable, e. g., epilepsy, hydrophobia, whooping-cough, asthma, uterine cancer, chronic eruptions of the skin, scrofula, jaundice, &c., but the evidence of its utility in these affections is very slight, if not altogether illusory.

Externally this remedy is of great service as a discutient in bruises, lacteal engorgements, glandular swellings, commencing abscesses, dropsy of the joints, and even in hydrocele. Dr. A. T. Thompson' recommends it as a collyrium, with opium, in chronic ophthalmia, and, when diluted, as an injection in gonorrhæa. In porrigo of the scalp, he says, "I have ordered it with the best effect as a lotion."

Administration.—The dose of the officinal solution is from half a fluidounce to a fluidounce and a half, mixed with water and sweetened with sugar. But it is to be remarked that nearly all of the effects which have been attributed to the solution, by the writers referred to above, were obtained from the stronger preparations of the German and French Pharmacopæias. Of the German solution, the prescribed dose is one or two fluidrachms every two or three hours. This medicine is often associated with spirit of nitric ether, and with tartar emetic.

LIQUOR POTASSÆ CITRATIS.—Solution of Citrate of Potassa.

PREPARATION.—Under the names of neutral mixture and effervescing draught two forms of this useful medicine are employed. The former is prepared by saturating any quantity of bicarbonate of potassa with a solution of citric acid, or lemon-juice; or by directly dissolving three hundred and thirty grains of bicarbonate of potassa and half a troyounce of citric acid in half a pint of water. The latter is often prepared extemporaneously by adding "to a fluidounce of a solution consisting of equal parts of lemon-juice and water half a fluidounce of a solution containing fifteen grains of carbonate of potassa, or twenty grains of the bicarbonate." When lemon-juice cannot be obtained, a solution of citric acid, of the strength just mentioned, may be used as a substitute, but it is far less palatable.

These preparations constitute the fever draughts which are universally employed in England and in this country for inflammatory affections, and in the hot stage of paroxysmal fevers. The effervescing draught is usually most grateful to the patient, and is particularly useful when there is much nausea and thirst, both of which symptoms

¹ Dispensatory, p. 886.

true that, as too often sold, there is a large proportion of free acid in the liquid, but it is also then that its sedative action is least distinct. It is to this acid that must be attributed certain poisonous effects observed by Kraus¹ in a boy twelve years of age, who had taken a drachm of the spirit. For six hours he suffered from colic, and had copious slimy evacuations. When inhaled, its toxical effects are very decided. Hermbstadt experienced headache, throbbing of the temporal arteries, anxiety, and giddiness.2 Other experimenters, or observers, have described a cyanotic condition, giddiness, confusion of mind, a small, thready pulse, with loss of muscular power, and spasms, lasting from twelve to eighteen hours.3 It is related that a druggist's female servant was found dead in her bed, apparently poisoned by the fumes of the "spirit of nitric ether," a large bottle or jar of which was broken in her room.4 She lay on her side, with her arms folded, the countenance and posture composed, and the whole appearance that of a person in deep sleep.

Uses.—This medicine is most frequently used in febrile affections, with a view of allaying nausea, heat of the skin, and arterial or nervous excitement. Under these circumstances it may be associated with the neutral or the effervescing mixture, the spirit of mindererus, or a solution of tartar emetic. In idiopathic dropsy, and particularly in that form of it which arises from cold, or as one of the sequelæ of scarlatina, it sometimes proves sufficient to remove the effusion, but more frequently it must be associated with squill, acetate of potassa, or digi-In dysury from cantharides, or a too concentrated state of the urine, it generally affords relief. It is an agreeable and efficient carminative when flatulence is connected with sickness at the stomach. Externally it may be prescribed as a cooling evaporating lotion in neuralgic headache, but if long continued its acid irritates the skin. It has also been employed as an application to certain scirrhous ulcers of the lip supposed to be cancerous, in which case, according to Richter, its free acid is the curative agent.

Dr. Bowditch and Dr. Rickard have employed inhalations of the vapor of sweet spirit of nitre as a palliative of cough in acute and

chronic inflammations of the pharynx and larynx.

ADMINISTRATION.—It is usually directed in doses of from half a fluidrachm to two fluidrachms, in some diluent vehicle, and still larger quantities are advised in dropsy. These may be needful to obtain its diuretic operation, but in febrile affections its diaphoretic influence may be secured by much smaller doses, such as twenty or thirty drops repeated every hour or two.

¹ Mitscherlich, Handbuch, ii. p. 363. ² Strumpf, Handbuch, i. 1014.

^{*} MITSCHERLICH, loc. cit. 4 Edinb. Med. and Surg. Jour., xxxv. 452.

Boston Med. and Surg. Jour., Dec. 1858, p. 381.

Within an hour afterwards, hot and somewhat stimulant drinks may be administered. A less degree of diaphoretic influence may be maintained by doses of from three to six grains every two or three hours.

GUAIACI LIGNUM.—GUAIACUM WOOD. GUAIACI RESINA.—GUAIAC.

DESCRIPTION.—The wood and the resin of Guaiacum officinale. This is a tree from thirty to sixty feet in height, and is a native of the Antilles, particularly of Hayti and Jamaica. The bark is medicinal as well as the parts mentioned. The wood is the well known lignum vitæ, and is remarkable for its density. Owing to this quality, it is employed for many mechanical purposes. Its raspings and shavings are used by the druggists. When subjected to friction, or burned, it exhales an aromatic perfume. It has a bitterish and acrid taste. It contains twenty-six per cent. of resin, and a fractional proportion of a peculiar bitter and acrid extractive matter. A volatilizable acid is also extracted from it called the guaiacic, which has a close affinity to the benzoic, and is, indeed, thought by some to be identical with the latter; but it differs in being soluble by water, alcohol, and ether. The resin is the concrete juice of the guaiacum tree. It is of a greenish-brown or reddish color, whenever it is exposed to the air. Internally, it is rather of a reddish-brown color, and presents a shining conchoidal fracture. After having been chewed a little while, its taste is acrid and pungent, and it emits, when thrown on coals, a strong but grateful and aromatic smell. This resin is soluble in ether, alcohol, and alkaline solutions. The last named quality has caused it to be regarded as an acid.

The following are officinal preparations of guaiac:—

Tinctura Guaiaci.—TINCTURE OF GUAIAC.

It is obtained by percolation from six troyounces of coarsely powdered guaiac with sufficient alcohol to produce two pints of tincture. Dose, from one to four fluidrachms two or three times a day.

Tinctura Guaiaci Ammoniata. — Ammoniated Tincture of GUAIAC.

This preparation is made by macerating six troyounces of powdered guaiac in two pints of aromatic spirit of ammonia and filtering the solution. Dose, one or two fluidrachms. Both tinctures may be conveniently administered in milk, mucilage of gum, barley-water, or gruel.

Guaiacum also enters into the compound decoction and the com-

pound syrup of sarsaparilla.

HISTORY.—In the first expedition to America, several Spaniards affected with syphilis were cured of it by the natives with a decoction of guaiac.' In 1508, the wood was carried from Hispaniola to Spain and became known in Europe chiefly by the treatise on its effects in

really of service in constitutional syphilis of long standing, which affects the bones and skin, and is complicated with the evil results of a long mercurial course, especially in persons of a scrofulous, feeble, or impaired constitution.

At one time, a tincture of guaiac had much reputation in gout. It was advised by Cullen in the chronic forms of this disease. He directed from fifteen to thirty grains in an emulsion to be taken at night, so as to produce a cathartic operation. Quarin, Stoll, P. Frank, and others, recommended it under the same circumstances, but Chapman, on the contrary, thought it useful in the irregular forms of the disease,

as when it threatens the stomach, &c.

Dr. Dewees first employed this remedy in idiopathic suppression of the menses, and placed great confidence in its efficacy.1 But he considered depletion, purging, and low diet, essential preliminaries to its exhibition, and alleged that when thus employed, it never failed in any case proper for its use. Indeed, he held it to be "more certain than bark in an intermittent." Dr. Dewees used a tincture made according to the following formula: B.—Pulv. guaiac. res. 3iv; sodæ and potassæ carb. gr. xc; pulv. pimentæ 3j; alcohol dilut. Oiss. Digest for a few days, and, when wanted for use, add a fluidrachm or two of spirit of ammonia to every four ounces of the tincture. Of this tincture, a teaspoonful was directed to be given three or four times a day in milk or wine. Although so highly and urgently lauded by its proposer, it would seem to have been successful only in his own hands. We cannot discover a single competent authority to corro-In dysmenorrhæa guaiac was likewise reborate his statements. commended by Dr. Dewees. He observed that it sometimes increased the severity of the pain at first, even when it ultimately proved effectual. He was led to its employment "from supposing the disease to be a rheumatic affection," a most groundless supposition, as he indeed suspected it to be, but one which Dr. Rigby has since partially adopted. Dr. Wood mentions that he has found this medicine highly useful in painful menstruation. Dr. E. D. Fenner states that in dysmenorrhœa and consequent sterility he successfully made use of a formula recommended by Dr. Falk, of London, into which Canada balsam, oil of sassafras, and corrosive sublimate enter.3 This combination is analogous to those formerly in vogue for the treatment of constitutional syphilis.

In the subacute and chronic forms of rheumatism guaiacum and its resin are undoubtedly efficacious in proportion to the care which is taken to favor their diaphoretic operation. Dr. Graves says that, "whether given in the form of powder or tincture, it often proves an extremely useful remedy in cases of chronic rheumatism where no symptoms of active local inflammation or general fever exists."4 preferred, however, to prescribe it in conjunction with cinchona, sul-

phur, ginger, and cream of tartar.

4 Clinical Medicine, p. 662.

^{&#}x27; Essays on Various Subjects, &c., pp. 105 and 109.

² U. S. Dispensatory, 10th ed., p. 1233. ³ Am. Jour. of Med. Sci., Oct. 1858, p. 577.

used ad libitum. Of the essential oil (OLEUM SASSAFRAS) two or three drops may be given at a dose.

SERPENTARIA.

DESCRIPTION.—"The root of Aristolochia serpentaria of Aristolochia reticulata, and other species of Aristolochia." This is an herbaceous plant which grows chiefly in the Middle and Western States of the Union, in shady woods, and especially upon hill-sides. It has a perennial root, composed of numerous slender fibres arising from a short, knotty caudex. As found in the shops, the odor of the root is aromatic and agreeable, resembling that of camphor, and it has a pungent, bitter and aromatic taste. Alcohol and water extract its virtues, which appear to depend upon a volatile oil and a resin, the former of which concretes into a substance resembling camphor. Chevallier found in it a yellowish, bitter, and acrid principle, soluble in water and in alcohol.

The officinal preparations of serpentaria are the following:—

Extractum Serpentariæ Fluidum.—Fluid Extract of Serpentaria.

Twelve fluidounces of tincture having been obtained by percolation with diluted alcohol from sixteen ounces of serpentaria, it is set aside until two pints and a half more of tincture are obtained. The latter is then reduced to four fluidounces, and mixed with the reserved tincture. Dose, half a fluidrachm.

Infusum Serpentariæ.—Infusion of Serpentaria.

This infusion is prepared by macerating half a troyounce of serpentaria in a pint of boiling water for two hours in a covered vessel, and straining off the liquid. It may also be procured by percolation. *Dose*, one or two fluidounces.

Tinctura Serpentariæ.—Tincture of Serpentaria.

Four troyounces of serpentaria are percolated with diluted alcohol to the production of two pints of tincture. Dose, one or two fluidrachms.

Tinctura Cinchonæ Composita.—Vid. Cinchona.

HISTORY.—This root was used by the American aborigines as a cure for snake-bites (whence its name), and by the early colonists as a tonic and stimulant. It was introduced into medicine by a London apothecary, named Johnson, in 1633. Sydenham alludes to it as a remedy for intermittent fever, when infused in white wine and taken so as to produce sweating before the fit.

ACTION.—Its properties have been investigated by Jörg.³ The powder and the infusion were employed in a large number of experiments made by his associates and himself, and from them he drew the following conclusions: Serpentaria occasions nausea, eructation, vomiting, constriction and pain in the stomach, borborygmi, colic in the small

¹ Mérat and De Lens, i. 415; Strumps, i. 559.

² Works, Syd. Soc. ed., ii. 239.

³ Materialien, i. 179.

continuing it, three times a day, for a month, prevented a return of the disease. Some persons have also attributed to it anthelmintic

properties.

Administration.—The dose of the powdered root is from ten to thirty grains. Of the infusion the dose is one or two fluidounces every three or four hours in low forms of fever, but less frequently in chronic affections. Of the fluid extract of serpentaria the dose is half a fluidrachm; of the tincture it is one or two fluidrachms; but both are inferior to the Compound Tincture of Peruvian Bark, into which serpentaria enters, and of which the dose is from one to four fluidrachms.

Ammoniæ Carbonas, vid. Stimulants.
Potassæ Nitras, "Diuretics.
Antimonii et Potassæ Tartras, "Emetics.
IPECACUANHA, "do.
Sarsaparilla, "Alteratives.
Mezereum, "Irritants.

DIURETICS.

DIURETICS (δια, through, ουρον, urine; διυρητικος, diuretic) are medicines

which tend directly to increase the secretion of urine.

According to this definition, the number of medicines which in various states of the economy are adapted to promote the urinary discharge would be much more restricted than in practice is found to be necessary or convenient; for in numerous morbid conditions the deficiency of urine depends, not upon any defect in the organs appropriated to the function of secreting it, but to derangements of others which interfere more or less with the action of the kidneys. to go one step further forward, the secretion of urine may be duly performed, but its discharge externally may be prevented by some obstacle in the urinary passages. For example, an obstruction of the ureters may exist, such as a thickening of their coats, or possibly a spasm of their muscles, or, what is more frequent, a calculus, or inspissated mucus, or even an entozoon, may be contained in the canal. But in such cases the obstacle is usually confined to one of the two organs, and, that of the opposite side of the body assuming the functions of both, effectually accomplishes the depuration of the blood.

The instances in which other organs than the uropoietic prevent the proper secretion or discharge of the urine are also numerous. Of these, some are closely analogous to the group which has just been referred to. Such are physical agencies interfering with the secretion or with the discharge of the urine, or with both at the same time. Everything which mechanically compresses the ureters will prevent the escape of the urine from these canals. By accumulation behind

as they do that of every glandular structure, whether it be in consequence of the changes which the blood undergoes, and by which it becomes more dense, and consequently less adapted to enter the capillary vessels in which the function of secretion is performed, or whether it depend upon an infarction of these vessels with such viscid blood, or of the ultimate branches of the efferent ducts themselves with the débris of the destructive processes going on in them, or, finally, upon the mere tension of the bloodvessels from the excessive amount of blood contained in them, and which the suspension of the usual secretions and excretions which in health are discharged from the body must tend to augment.

In the preceding paragraphs several distinct categories have been referred to of diminished discharge of urine, and several examples of each have been mentioned, but in scarcely one of them are diuretics the appropriate remedies, which, indeed, are almost as various as the illustrations themselves. Mechanical causes of obstruction within the urinary organs are, some of them, irremediable, and of one, a calculus in the ureter, although its removal may be favored by diluent drinks, the discharge will more certainly be promoted by opiates and antispasmodics. If defective urination results from the pressure of an accidental formation, such as an ovarian, mesenteric, or other tumor, it is for the most part insusceptible of successful treatment; if from congestion or other remediable obstruction of the liver, mercury will prove the best diuretic, or else colchicum or taraxacum may succeed; or if from a similar condition of the spleen, of miasmatic origin, quinia is the most efficient remedy; in other cases iodine may prove an active indirect diuretic; a purge may produce diuresis by removing the accumulated contents of the bowels, or the operation of tapping by relaxing the over-distended abdomen; digitalis, apart from any direct action upon the kidneys, which it has been denied to possess, or prussic acid, independently of such an action, may cause a free discharge of urine when it has been prevented by the irregular or violent action of the heart; general depletion is the capital remedy when the imperfect secretion is due to a high febrile action, with tension of the whole vascular system, and even in some cases of general dropsy with fever; and local depletion from the loins is even more certain in its effects when scanty urine is owing to an inflamed or congested state of the kidneys. On the other hand, their secretion may be restored, when it is suspended by loss of fluids, if appropriate liquids can be retained in the system after their introduction into the stomach or the veins.

Here, then, are numerous means by which the discharge of urine may be increased, and under various circumstances; but they cannot strictly be called diuretics, and hence it is proper in defining this class to restrict the title to medicines, the direct action of which is to augment the secretion of urine. By the term urine, however, we cannot understand a liquid which is uniformly of the same composition. Even its physical qualities vary greatly in health and in disease, so that from time immemorial they have been looked upon as affording valuable indications of the nature or the progress of diseases. It is

sent class of diuretics, in the cure of dropsy, that they stimulate the absorbents to remove the effused liquid contained in the several serous cavities of the body or in the cellular tissue; but it is now certain that the veins, and not the absorbents, are the principal channels through which the absorption takes place, and not by virtue of any active property residing in them, but simply because, in obedience to a physical law, when the veins are drained of the watery portion of their contents, through the kidneys, or otherwise, a transudation of the dropsical effusion tends to occur from the serous cavity which contains it into the denser liquid within the veins. Thus through them as channels between the dropsical cavity and the free surface of the kidneys, the water is, as it were, pumped out of the system. This rationale is most applicable to dropsy produced by mechanical causes, and independent of inflammation of the serous membrane in which the effusion is contained. When the latter condition exists the membrane may be no longer in a condition to allow the passage of water through it, or at least without a greater force being applied to it than the one just mentioned. Indeed, in both of these cases the association with diuretic medicines of others which are adapted either to produce resolution of an indurated parenchymatous organ, or to promote the absorption of the false membrane which acts as a barrier to the passage of the effusion into the bloodvessels, will expedite the cure, or may constitute an essential element of it.

In many cases the efficient cause of dropsy is unknown or only conjectural, and then the exhibition of diuretics should be cautiously resorted to. If the more favorable condition should be present, viz., that in which there is no mechanical and insurmountable impediment to the cure, it will be best secured by means of these medicines. Or if, on the other hand, such an obstacle should exist, as in cases of valvular disease of the heart, they may still promote the evacuation of the effused serum, and thereby promote the comfort of the patient, and prolong life although it may be impossible to save it.

There is, moreover, a choice to be made among djuretic medicines in the several forms of dropsy, and it frequently happens that a combination of a renal hydragogue with a depurative diuretic is much superior in efficacy to either alone. Indeed, in the simplest of all the varieties of this affection, general anasarca produced by cold, it is found that members of the former class are more efficient than those of the latter, that acetate or bitartrate of potassa will evacuate the water much more rapidly than juniper, broom, squill, &c., but not so much so as a preparation in which both are associated. If an inflammatory element underlies the dropsical effusion, it should be combated chiefly with alterative doses of mercury and with digitalis, during the continuance of the active symptoms, and afterwards with these agents in conjunction with squill. If, in ascites, the liver is the organ upon which the dropsy depends, mercury is usually exhibited in conjunction with taraxacum, colchicum, or squill. But if the effusion is connected with a persistent albuminous state of the urine, the use of mercury is generally contraindicated, and often involves serious danger, so that the cure by diuretics must be confided to digitalis, and

noxious substances, also, received from without, such as mercury and lead, may be eliminated with the urine after having remained for a

long time quiescent in the economy.

The diuretic agents which thus depurate the blood are chiefly water and saline solutions. In acute febrile diseases, and in those of a more or less chronic character attended with local inflammation, there can be no doubt that whatever tends to renovate the blood, even in its aqueous portion, must aid in removing from the system as well the actually effete matters circulating in the blood as those which still maintain a feeble organic connection with the solids. As we observe, even in the external appliances of surgery, the advantage of washing away the results of disorganization of the tissues, we may plausibly infer that a constant renewal of the great solvent element of the blood in like manner hastens the separation of morbid particles of the solids, and their elimination with the urine. Thus Becquerel first remarked that even in health, and although the quantity of solid food remained the same, the amount of solid matter in the urine is somewhat increased by increasing the quantity of water used as a drink. This statement has been fully confirmed by Bird, who explains by its means the efficacy of numerous springs famous for their curative virtues in chronic disorders, and which are but little, if at all, mineralized.

Those diuretics which augment the proportion of solid matters in the urine ameliorate the symptoms of many diseases which are regarded as most probably dependent upon a specific or otherwise noxious matter in the blood. It seems probable, therefore, that they decompose, destroy, and eliminate a material morbid cause circulating in the blood, or, what is quite as probable, that they promote the elimination of the effete substances which have been produced by the action of that morbid cause, and thus literally purge the capillary bloodvessels of the noxious materials with which they are loaded, and which interfere with all the processes of a healthy nutrition. It seems to be a rational opinion that every disease, and especially every febrile disease, is attended with an increase of the destructive processes proper to the economy, while the organs destined for the elimination of the resulting substances become engorged and unable efficiently to continue their function. This is evidently the case in regard to the liver in miasmatic affections, in which, while the disease is in activity, the secretion of bile is diminished; or if temporarily increased, it is only so because a sudden and excessive afflux of blood towards the organ has taken place. But subsequently the secretion is diminished, and the liver becomes engorged and swollen. Even the spleen, which, in some sense, is a gland placed upon the channel of the circulation to accomplish certain changes in the blood which passes through it, becomes, in like manner, distended, in part by mechanical pressure from behind during the cold stage of the paroxysm, but also, in some degree, it may be, by the accumulation of blood in it which is not of such a composition as adapts it to undergo the changes which occur in health, and which is not, therefore, in a condition to be carried forward

¹ Séméiotique des Urines, 1841, p. 140.

Juniper, copaiba, turpentine, and cantharides are the most important agents of this description, and are of the utmost value in disorders of the mucous membrane of the urinary organs. They and their associated medicines are generally inappropriate when the urine contains sugar, or fatty matter, or blood, and should be very circumspectly employed in dropsy accompanying albuminous urine, even when the amount of the dropsical effusion renders an evacuant of the serum necessary.

Renal depuratives, and here saline diuretics are chiefly referred to, require for their due effect that they should be given in small doses and largely diluted, for otherwise they act as irritants of the bowels, and purge. This, indeed, is true of other diuretics, and in a marked degree of spirits of turpentine. The tendency of salines to be discharged either by the kidneys or by the bowels, depends in some degree upon individual peculiarities. Many persons resist the purgative action of saline mineral waters altogether, and, in many, even sulphate of magnesia acts more upon the kidneys than upon the Alexander mentions that except in enormous doses, this agest always produces a diuretic effect upon the horse. Besides the direct irritant action, upon the bowels, of saline medicines when given in large doses, and in a comparatively small quantity of liquid, which renders their action purgative, this action is greatly augmented by the attraction which they exert upon the watery constituent of the blood, for as the saline solution is denser than the liquor sanguinis, the latter transudes into the intestine and forms the liquid stools which are discharged. When largely diluted, on the other hand, saline medicines are absorbed, become diuretics, and are eliminated almost altogether with the urine. Such dilution is, then, the necessary condition of their proper diuretic operation.

In many instances the combination of medicines belonging to the class of acrid diuretics with the depurative agents, is of very superior value to the use of either of them alone. Indeed, there are few compounds intended to be diuretic which do not contain members of both classes; digitalis or squill is associated with acetate or nitrate of potassa, juniper with bitartrate of potassa, &c., and these are conjoined with indirect diuretics in such cases as those referred to at the beginning of this article. Such combinations must be varied from time to time in chronic cases of disease requiring the use of diuretics, for it is the case with these as with all other medicines, that their proper effect is

diminished by habitual use.

The greater number of diuretic substances may be divided into the following groups:—

DIETETIC.—Water, the great diuretic and lithontriptic agent, sugar, whey, buttermilk.

Fruits, containing acidulous or saline elements, as apples, pears, grapes, and their fermented juices, wine, perry, and cider, and also small beer; watermelons, and especially their seeds.

Vegetables, containing a saccharine or a peculiar principle, as car-

rots, parsnips, celery, and asparagus.

MEDICINAL.—Emollient, as poppy and hemp seeds, and almonds.

in the bladder, the use of this solution tends greatly to blunt the sensibility of the coats of the organ, and probably to moderate the inflammation which the presence of a foreign body must ultimately produce, and which may issue in complete disorganization. By such a palliative operation the salt diminishes, also, the irritability of the bladder which prompts to frequent and painful attempts to void the urine. The tendency to calculous affections may also be diminished by neutralizing acidity developed in the stomach and bowels in feeble states of the digestion. Thus, a scruple of the carbonate or bicarbonate of potassa with four or five grains of nitre, as recommended by Dr. Prout, may be taken about four or five hours after a meal.

Theoretical notions of its action, according to which it was classed along with mercury, led to the employment of potassa and its carbonates in pseudo-membranous affections, glandular enlargements, &c. But experience has not fulfilled the anticipations of the physiologico-chemical school. In vain it was used in puerperal peritonitis, in croup, in pneumonia and other inflammatory affections, by physicians of skill and reputation. It is never relied upon now in such diseases; nor indeed was it by those who at first urged its value most earnestly,

for they conjoined mercury with it in every instance.

In certain forms of jaundice, not easy of recognition, however, but such as are supposed to depend upon inspissated bile, these preparations are sometimes useful, perhaps, by their catalytic action upon the blood. Under the circumstances mentioned, however, the carbonates of potassa would appear to promote the excretion of the biliary fluid. The cases in which they are most evidently beneficial are those in which jaundice occurs in persons of intemperate habits, before the degeneration of the liver has gone so far as to produce ascites. Under these circumstances they may be given in some bitter infusion such as that of wormwood.

In Scotland carbonate of potassa has from time immemorial been used in conjunction with cochineal as a remedy for whooping-cough. Dr. Wachtl, of Vienna, found its effects instantaneous and constant. It has also been commended by Gregory, Armstrong, and others, but

is not often employed at the present time.

Carbonate of potassa has formed one of the ordinary medicines in the treatment of skin diseases for a long time past. Internally, it appears to be best adapted to cases in which the digestive and urinary organs are at the same time deranged, and a superabundance of acid is formed in the system. Externally it is applied in lotions, baths, ointments, &c., for the relief of the chronic forms of scaly, pustular, and other species of eruption.

ADMINISTRATION.—The dose of carbonate of potassa is from ten to thirty grains, and of the bicarbonate double this quantity. For external use, a lotion composed of one hundred and twenty grains of the carbonate in a pint of water may be employed, or an ointment containing from ten to sixty grains of this salt in an ounce of lard.

¹ Gibb, On Whooping-Cough, pp. 312, 320.

symptoms of poisoning were manifested. A solution of the salt injected into a vein is generally fatal after having produced convulsions.

On Man.—The effects of nitre upon the human economy vary greatly with the dose and the degree of its dilution. Opinions have differed very much respecting its essential operation, and to this day they may be regarded as unsettled. In the last century, Alston described it as resolvent, antiseptic, antiphlogistic, diuretic, purgative, and anaphrodisiac; and Boerhaave expressed similar opinions. This philosopher noticed its power when mixed with freshly-drawn blood to prevent its coagulation and to brighten its color. Alexander observed that it acted upon the skin, or upon the kidneys, according as the patient took warm or cold drinks. In Löffler's account of a series of experiments performed upon themselves by five young men, all in good health, a drachm of the salt, it is said, was taken the first day, and the dose gradually increased until between three and five ounces in all were taken. The symptoms observed were these: general weakness and indisposition to exert either body or mind, low spirits, facility to be fatigued, disposition to sleep, and a slow and weak pulse. The pulse gradually became less frequent, until towards the end of the experiments it was several times reduced to twenty beats in the minute; nor did it recover its normal frequency for seven or eight days after the discontinuance of the medicine. The appetite and digestion were unaffected, and the bowels were only purged occasionally. There appeared to be some degree of diuresis.3 In Jörg's experiments! the quantity of urine was so uniformly augmented as to cause this effect to be regarded by him as the principal one. He found that soon after the medicine was taken, undissolved or in strong solution, that it produced a sense of dryness in the fauces, thirst, craving appetite, and heat in the stomach like that of inflammation, with eructations, and sometimes, if the dose was large, vomiting, flatulence, colic, and diarrhœa, with tenesmus, or, on the other hand. constipation, either with perspiration or an increased flow of urine. Jörg hence concludes that nitre cannot, any more than arsenic, be called an antiphlogistic; that it is an irritant; and that its continued use must impair the digestion. The latter statement is certainly true, but it does not disprove the "cooling" or sedative action of the remedy upon the system generally when taken in a due state of solution, nor does it contravene the assertion that nitre diminishes the plasticity of the blood, and may even induce a scorbutic state of the system. This change in the blood was more precisely defined by Löffler, who found, in his experiments, that the proportion of the solid constituents of the blood was reduced by nitre, as well as the firmness and elasticity of its clot. The same condition was observed by Dr. Basham.

Martin Solon, in his observations on the use of nitre in rheumatism, states that in many cases it brought on diarrhoea, which, however,

¹ Materia Medica, i. 179.
² Experimental Essays, p. 117.

SCHMIDT'S Jahrbuch, 1848, and Edinb. Month. Jour. and Retrospect, Apr. 1849, p. 91.

⁴ Materialien, p. 48.

⁵ Compare M. Solon, loc. inf. cit., Vogt, ib., and Richter, iv. p. 239.

⁶ Lancet, Nov. 25, 1848.

dreadful diarrhœa took place, with awful griping and bloody stools." Yet this patient recovered. Sometimes few or none of these symptoms present themselves, even in fatal cases. A case is reported in which an ounce proved fatal to a healthy man in about twenty minutes. He vomited violently. Dr. Snowden's relates the case of a man who took, by mistake for Epsom salts, three ounces and a half of nitre at one dose. His bowels were opened three times within as many hours; he complained of slight pain in the epigastrium, and drank a good deal of water. About five hours after having taken the saltpetre, he suddenly fell out of his chair and expired. No dissection of the body was made, but the lips remained of a lifelike pink color on the third day after death. In this case the sudden death may perhaps be attributed to the erosion of a large bloodvessel of the stomach. In the absence of violent nervous symptoms it may be compared with one or two earlier cases. Such an one is recorded by Butter of a pregnant female, who, after taking an ounce of nitre, vomited blood, but had no other active symptoms with the exception of choreic spasms which lasted for several days. No doubt a large proportion of the poison was vomited. Another case is reported by Vanoye, in which a female, sick with typhus fever, took an ounce and a half of nitre by mistake. She vomited bile and a large quantity of blood, but afterwards recovered.

In fatal cases, after death the contents of the stomach sometimes consist in part of blood; the gastric mucous membrane is of a dark red color, sometimes corroded; its veins are distended, and blood is effused within and beneath it. The upper portions of the small intestine are more or less in the same condition.

In Rheumatism.—Nitre was employed for the cure of this disease towards the close of the last century in England, by Brocklesby, Macbride, and Whytt. The first named physician gave ten or more drachms of it in twenty-four hours dissolved in four or five quarts of barley-water. Copious sweating and great improvement or recovery ensued, it is said, within three or four days. In later times this practice was revived in France by Gendrin and Martin-Solon, to the latter of whom we owe the fullest details of its results. He was of opinion that the method was not only devoid of risk, but possessed decided advantages. As a medium dose he prescribed one ounce to be taken in the course of the day, but sometimes double that dose, dissolved in a large quantity of weak lemonade or some slightly aromatic infusion, sweetened, and administered every hour. It produced no sensible phenomena other than that in the course of two or three days it caused the pain in the joints to subside, while none were invaded anew, and the attack was cured by the tenth day. Dr. Basham imitated this plan exactly, and reports analogous results.' Dr. B. used the solution upon spongio-piline as a local application to the affected

¹ Lancet, Nov. 1857, p. 484.

² Ann. d'Hygiène, 2ème sér., xvi. 400, where several other cases are given.

⁸ Phil. Med. Exam., Apr. 1855, p. 244.
⁴ Ed. Med. and Surg. Jour., xiv. 34.

⁵ Month. Retros. of Med. Sci., April, 1849, p. 92.

⁶ Bull. de Therap., xxv. 250. ⁷ Lancet, Nov. 25, 1848.

solution, nor so thick as to take up too much of it, nor made of woollen or other fibres which give off acrid fumes in burning. It is also of the utmost importance that the remedy should be resorted to at the very commencement of the paroxysm, and before there is superadded to the nervous element congestion of the bronchial tubes. The utility of nitrate of potassa in spasmodic asthma, taken in connection with the efficacy of tobacco, antimony, and ipecacuanha in the same affection, proves that its mode of action is essentially sedative, and corresponds with the effects of the medicine in large and poisonous doses.

From the well-known efficacy of orange and lemon-juice, as well as of potatoes and other fresh vegetables, in the prevention and cure of scurvy, it has been inferred that they owe this property to the potash contained in them, and, consequently, that nitrate of potash would be found an antidote to scorbutic symptoms. But, like so many other scientific anticipations in therapeutics, this one has received no confirmation when brought to the test of experience. contrary, the comparative trials which were instituted on board of the English convict ships led to the conclusion that nitre is destitute of the antiscorbutic qualities that have been assigned to it, while its nauseous, mawkish taste, and injurious effects on the system generally rendered it worse than useless. It is true that, as early as 1794, Mr. Patterson advised a solution of nitre in vinegar as preferable to lemon-juice in scurvy; and in 1829 Mr. Cameron found this same solution, or that of nitre in lemon-juice, to be a very effectual cure; but results obtained from such mixtures are far from being a measure, or even an indication, of the value of nitre itself as an antiscorbutic.

Although classed with diuretic medicines, and capable of exerting a diuretic action, nitrate of potassa is very seldom used in the treatment of dropsical affections, for the cure of which so many other

agents operate in a more certain and agreeable manner.

Administration.—Nitre may be given in doses of from ten to thirty grains or more, in the form of powder or in solution. The latter is the preferable mode, and the quantity of liquid employed should be large. When an overdose of nitre has been taken, the only efficient antidote is water, or some bland liquid, by means of which whatever portion of the salt continues undissolved may be rejected, and what remains may be diluted so much as to render it innocuous. The gastric inflammation is to be combated by cold drinks, leeches to the epigastrium, &c.

POTASSÆ ACETAS. -- ACETATE OF POTASSA.

DESCRIPTION.—Acetate of potassa exists in the juices of many plants. It is prepared artificially by the action of acetic acid upon bicarbonate of potassa, or by the double decomposition of acetate of lead and sulphate of potassa.

¹ Lancet, Aug. 1858, p. 223.

BRYSON, Med. Times and Gaz., March, 1850, p. 213.

alterant than by goading the liver with remedies whose influence it refused to obey; and in more than one instance a strumously enlarged cervical gland has yielded to the persistent use of an analogous remedy, even after resisting the iodide of potassium." This author shows, further, how the depurative action of the remedy corrects the malarious cachexia, and renders the previously ineffectual preparations of bark or arsenic sufficient for the cure of periodical fever. Even in recent tertian ague he found that when the paroxysms were well marked it diminished their intensity.

Of the use of acetate of potassa in acute rheumatism, Dr. Bird says: "I have seen the cure to be more rapid, and the immediate relief to the patient more marked by the use of the acetate of potass in quantities of half an ounce, administered, largely diluted, in divided doses, in twenty-four hours, than by any other treatment. In three days, I have repeatedly found the exquisite pain of the joints nearly absent." He was also impressed with a belief that it lessens the chance of cardiac complications, if given so as to render the urine alkaline. He used no other treatment than this salt, except, perhaps, a full dose of Dover's powder, when the pains were at the first severe; and the affected joints were always wrapped in cotton wadding. In this and in the other affections distinguished by an excess of uric acid, it acts in the same manner as the analogous compounds with vegetable acids; that is to say, it is decomposed, the acid absorbs oxygen, and is converted into carbonic acid and water, of which the former unites with the base, and, on being secreted with the urine, neutralizes its free acid, or even renders the liquid alkaline.

Alluding to the cachectic states accompanied by glandular engargements and furunculous eruptions, and those deranged conditions usually styled bilious, Dr. Bird assures us that the advantage gained by the use of this remedy is remarkable. Thus it is that in all points he confirms the conclusions of the earlier physicians above referred to, but which have been too long allowed to remain without practical ex-

tension, even when they were not discredited.

In several forms of dropsy, acetate of potassa is a valuable diuretic. So distinct is its operation on the kidneys, that it formerly was known as sal diureticus. Alibert found it very serviceable in hydrothorax. Voigtel states that it is peculiarly efficient in jaundice and dropsy depending upon "torpor of the liver." Other writers prefer it to be given associated with squill or digitalis. In cases of idiopathic and scarlatinous anasarca we have used it with almost uniform success, even when prescribed alone. If it fail to act, or if it do so imperfectly, the addition of the articles just mentioned will nearly always provoke abundant diuresis. It may also be given in the infusion of parsley, broom, dandelion, &c.

In several forms of skin disease, particularly psoriasis and eczema, this medicine has been very successfully employed by Dr. Easton, of Glasgow. Several of the cases reported by him had resisted other methods of treatment.

¹ Month. Jour. of Med., May, 1850.

eliminated. M. Bouchardat, in a note upon this subject, says that although in practice the apprehension may prove to be unfounded, still one might fear lest the salt should give rise to the formation of an insoluble ammoniaco-magnesian phosphate, and thus increase the risk of calculous disease.

In a number of cases occurring under his own observation, and that of Drs. Power and Frick, Dr. Buckler found that lithic acid disappeared from the urine rapidly under the use of this salt. Hence he proposed it as a means of preventing the precipitation of lithic acid from the urine and the generation of calculus, and even of procuring the solution of calculi already formed. Its power of keeping lithic acid in solution in the urine has been confirmed by Dr. Golding Bird, who considers it to be equal if not superior to borax and phosphate of soda for this purpose. He also found it of service in the more recent effusions into the joints in the subacute forms of rheumatic gout. did not, however, attribute to it any influence upon the tophaceous deposits already formed in the joints, &c. The remedy has since been tried by many physicians, and some favorable results of its operation have been published. Dr. Edwards, in England, used it with "great success in almost every variety of gout and rheumatism, both prior to the development of the inflammatory stage and after its partial subsidence." He adopted the explanations of its action suggested by Dr. Buckler, but without naming the source of his first knowledge of the subject. Dr. Mattei, of Bastia, also published several cases intended to show the efficacy of the medicine in gout and rheumatism.

This remedy was fairly tried in acute and subacute rheumatic cases by Dr. Pepper, at the Pennsylvania Hospital, and patients recovered under its use sometimes when other plans of treatment had failed. In some instances it nauseated and purged, and Dr. Wells states that he has heard of very unpleasant symptoms following its use. While, therefore, the phosphate of ammonia must undoubtedly be admitted among the available therapeutical solvents of lithic acid, it does not appear to possess qualities much, if at all, superior to those of the alkaline carbonates of the vegetable salts. Experience has not, how-

ever, pronounced definitively upon its value.

ADMINISTRATION.—Phosphate of ammonia may be given in doses of from ten to twenty grains, three times a day, dissolved in water.

ARMORACIA. - HORSERADISH.

DESCRIPTION.—Horseradish, which is no longer officinal, is the fresh root of Cochlearia armoracia, a native of Europe, where, as in other civilized countries, it has long been cultivated as a condiment. It

On Urinary Deposits (2d Am. ed.), p. 148.

• Am. Jour. of Med. Sci., Jan. 1849, p. 49.

" On Gout, p

¹ Am. Jour. of Med. Sci., Jan. 1846, p. 108.

Annuaire de Thérap., 1848, p. 98.

⁴ Provin. Med. Jour., Nov. 1847, and Am. Jour. of Med. Sci., Jan. 1848, p. 239, and ibid., Oct. 1850, p. 496.

grows in rich and rank soils. The root is long, white, and cylindrical. The stem is about two feet high; its lower leaves are dark-green, and lance-shaped; the upper are smaller, and without footstalks. The flowers are white, and in terminal clusters.

Horseradish has a pungent odor, and its exhalations readily make the eyes water. Its taste is warm, acrid, and slightly sweet. It imparts its properties to water, vinegar, and alcohol. They depend upon a volatile oil which is readily dissipated by heat or exposure to the air.

An infusion of horseradish may be made by infusing an ounce, each, of fresh horseradish root and bruised mustard seed in a pint of boiling water, and macerating them for two hours. Dose, a wineglassful three or four times a day. The Compound Spirit of Horseradish (Br. Phar.) is prepared by distilling proof spirit upon horseradish, orange-

peel, and nutmeg.

ACTION.—The volatile oil just referred to has, at first, a sweetish but afterwards a very acrid taste. When applied to the skin it acts as a rubefacient. Horseradish in considerable quantities produces a sense of warmth in the stomach, and assists the digestion of animal food. In excessive doses it creates a burning heat at the epigastrium, followed by nausea and vomiting. It augments the secretion of urine, and perhaps that of the perspiration also. Tiedemann injected an ounce of its juice into the crural vein of a dog, and immediately afterwards detected its characteristic odor upon the animal's breath.'

USES.—Horseradish has been more celebrated for its antiscorbutic virtues than for any other property. Linnæus calls it a divine remedy in what he terms scorbutic affections of the chest. Bergius says that he has known a teaspoonful of the scraped root taken every morning fasting for a month, without being masticated, and followed by a draught of tea prepared from juniper tops, to act very beneficially in scorbutic diseases. Cullen remarks that it has the reputation of being most effectual in scurvy when eaten fresh as a salad, or in the form of a conserve of the expressed juice. Cochlearia officinalis, or scurvy grass, an allied species, is, as its name implies, considered to be eminently antiscorbutic.

In recent times, this medicine has not been much employed as a diuretic, but formerly it had some vogue as a remedy for dropsy. According to Murray, it acts favorably in atonic forms of the disease. Sydenham included it with several other diuretic plants in his prescriptions for dropsy following intermittent fever. Huss employed it successfully in albuminous nephritis, and Rayer in anasarca.

When the digestive powers are feeble and the appetite fails in chronic diseases, or from mere exhaustion of the system, it may be used with great advantage as a condiment.

As an external application, it is useful when a rapid and decided counter-irritant is required. Murray recommends it mixed with mustard and flour as a revulsive to the soles of the feet in soporose affec-

¹ Metscherlich, Lehrbuch, ii. 559.

^{*} Mat. Med., ii. 164. VOL. II.—84

^{*} Mat. Med., ii. 559.

⁴ Dubois, Mat. Méd. Indigéne, p. 132.

tions. As a masticatory in toothache, it sometimes affords relief by exciting a flow of saliva, as well as by its counter-irritant action. The infusion has been employed as a gargle in relaxed states of the pharynx and larynx. A mixture of the juice with vinegar is recommended by

Voigtel for removing freckles and tan.1

ADMINISTRATION.—Horseradish-root, grated or scraped, may be given in doses of from half a teaspoonful to two or three teaspoonfuls. The compound infusion, which contains mustard-seed, is an excellent stimulant diuretic. The dose is two fluidounces three or four times a day. It may be rendered more active by the addition of compound spirit of horseradish, of which the dose is from one to four fluidrachms.

SCOPARIUS.—BROOM.

DESCRIPTION.—The tops of Cytisus Scoparius. This shrub, which is a native of Europe, derives its name from the bushy stalks (ozonos) of which it is composed, and which are used for the same purposes as the tops of broomcorn. It abounds in all parts of Europe, where it is used as fuel, but in this country is only cultivated in gardens on account of the sweetness of its flowers, of which the bees are very fond.

Broom tops contain a large proportion of carbonate of potassa. They have a bitter, nauseous taste and a peculiar odor, which depend chiefly upon a volatile base, which is a powerful narcotic resembling conia and nicotine in its action. For this supposed principle the name of spartein has been proposed by Dr. Stenhouse, and that of scoparin for another which is represented to be diuretic in the dose of five or six grains. But Schroff, after the administration of even a larger dose, observed no diuretic effects, but only colic and borborygmi. The decoction of broom occasionally excites considerable

irritation in the kidneys and urinary passages.

Uses.—Broom has long been employed in Europe as a popular remedy, especially for dropsy. In Floyer's Touchstone of Medicines (1687) it is said to be good "in the scurvy, jaundice, and dropsy," and in Culpepper's Herbal, of the same period, the powder of the seeds is described as purgative, emetic, and diuretic, as a cure in dropsy, gout, sciatica, and jaundice, and also as a diaphoretic in ague. Prepared with oil, it is recommended as a cosmetic. Cullen, after learning its popular reputation, employed it in dropsy, ordering half an ounce of the fresh tops to be boiled in a pint of water down to one-half of that quantity, and giving two tablespoonfuls of the decoction every hour until it operated by stool, or the whole was taken. It seldom failed, he says, to operate both by stool and urine, and by repeating the dose every day or every second day some dropsies were cured. Mead speaks of curing an ascites by this preparation, and also of the usefulness of the ashes of broom in the same disease. The latter were

¹ Arzpeimittellehre, iii. 54.

⁸ Med. Works, p. 390.

transverse slices of the bulb, which are somewhat contorted. They are generally of a pale, reddish-buff color or else nearly white. They are brittle when dry, but usually are rather tough. They have also a faint smell, and an acrid, bitter, and nauseous taste.

The officinal preparations of squill are the following:—

Acetum Scilles.—VINEGAR OF SQUILL.

In making this preparation, four troyounces of bruised squill are treated by percolation with diluted acetic acid to the production of two pints of liquid. *Dose*, thirty minims gradually increased to two fluidrachms, and administered in some aromatic liquid.

Pilulæ Scillæ Compositæ.—Compound Pills of Squill.

These pills are composed of squill, ginger, ammoniac, soap, and syrup. Each pill contains half a grain of squill, and one grain of ammoniac. *Dose*, as an expectorant, in chronic bronchitis, one pill three or four times a day.

Syrupus Scillæ.—Syrup of Squill.

This syrup is made by dissolving with heat, twenty-four troyounces of sugar in a pint of vinegar of squill, and straining the solution. Dose, half a fluidrachm to two fluidrachms.

Syrupus Scillæ Compositus.—Compound Syrup of Squill. Hive Syrup.

This medicine is prepared by percolation, by first making a solution of the active properties of squill and seneka, in diluted alcohol and water, converting it into a syrup, and dissolving in it tartrate of antimony and potassa. One grain of the last named ingredient is contained in every ounce of the syrup. It is a sedative emetic, with an especial tendency to promote the secretion of the bronchial mucous membrane. Dose, from five drops to a fluidrachm, repeated at intervals of ten or fifteen minutes, when it is intended to produce vomiting. Its sedative effects on children are sometimes alarming.

Tinetura Scillæ.—TINCTURE OF SQUILL.

It is made by percolation of four troyounces of squill with diluted alcohol to the production of two pints of tincture. *Dose*, from ten to twenty minims, as a diuretic. It is particularly adapted for application by friction to the skin in cases of dropsy.

HISTORY.—Squill is mentioned, and its virtues are described by many ancient writers. Besides Hippocrates, who alludes to it, we find that Pythagoras wrote a complete treatise concerning this plant.¹ Pliny fully describes the mode of preparing a vinegar of squill which, according to him, clears the vision, and is good for abdominal pains, but in an overdose destroys life. He also speaks of this preparation and of the honey of squills, as useful in dropsies, for enlargement of the spleen, and for some forms of indigestion. According to him, squill will cure scrofulous and other affections of the skin when applied in a cataplasm; &c.² Dioscorides attributes to it similar qualities, and further extols vinegar of squills for its virtues in healing spongy and ulcerated gums, as a gargle in ulcerated sore throat, and

¹ PLINY, Hist. Nat., xix. 30.

substance destroyed a strong dog of medium size within twenty-four hours.1

On Man.—The juice of the fresh plant applied to the skin acts as a rubefacient. From the internal use of squill fatal poisoning has sometimes resulted. A case of this sort is recorded by Lange. Quarin even asserts that twelve grains of it may prove fatal. Pregnant women who have used it to produce abortion, have perished in consequence. Plenk saw convulsions produced by it in a child. A case is related in which a drachm of the powder was taken to relieve a fit of asthma, but it produced violent and painful vomiting, great prostration, itching and an eruption of the skin, injected face, great heat of the trunk and head, and coldness of the extremities. The result was not, however, fatal.

In general, the effects of an overdose of squill may be thus described. When very excessive, there is violent emeto-catharsis, severe colic, dysury or bloody urine, rapid breathing, and general convulsions. In somewhat smaller doses, vomiting and diminished secretion of urine are still the prominent symptoms, and the pulse is found to be less frequent than natural. In small or medicinal doses, squill, in the. great majority of cases, exerts a diuretic action, and most frequently at the same time operates on the bowels. But its purgative action is never prominent except at the expense of its action on the kidneys. The characteristic effects seem to be most certainly produced by the powder, or by the wine of squill. The syrup and the oxymel appear to influence the pulmonary secretion more particularly. When used for some time, squill disorders the stomach, destroys the appetite, and impairs the digestive powers.

Squill produces its characteristic effects by absorption through the skin. Brera used it thus successfully in dropsy, as also did Lambert, Lentin, Bally, and Hosse. Krause found that the fresh root reduced to a pulp and applied to the skin, occasioned decided diuresis. Gerhard applied the powder to the denuded cutis in a case of ascites and in one of anasarca. Copious diuresis occurred in both, and the

patients recovered.

As an Expectorant.—Squill is useful in cases of bronchial inflammation of a mild form, when the sputa are tenacious and scanty, and the lungs are free from acute inflammation. Thus it will be found serviceable in chronic bronchitis complicating emphysema, and in all forms of chronic and subacute catarrh. Under these circumstances it is most usually combined with senega. It is also much employed as an ingredient in the compound syrup of squill, which is so popular a remedy in spasmodic croup; but it may be questioned whether the benefits derived from this combination are not chiefly due to the tartar emetic which it contains. In the decline of spasmodic, and even of membranous croup, squill may be of service in promoting secretion from the laryngeal mucous membrane.

As a diuretic, few medicines excel the one under notice, and hence it is in universal use in all the forms of dropsy. Even when the effusion

Annuaire de Thérap., 1857, p. 98. ² N. Am. Med. and Surg. Jour., x. 157.

to the presence of a volatile oil; the flavor of the latter is rather sweetish and mucilaginous.

HISTORY.—Dioscorides describes the wild carrot under the name of orappairos, applios.¹ He states that the seeds promote the menstrual flux and produce abortion, and that they are used as a diuretic in urinary disorders and in dropsy. He also mentions that the garden and the wild carrot have similar properties, but that they belong to the latter in a higher degree. This writer, and also Galen, say that the bruised leaves cleanse foul ulcers, and both ascribe aphrodisiac properties to the seeds. Rhazes gives a similar account,² and adds that carrots are heating and flatulent unless cooked. He calls them diuretic, laxative, and stomachic.

Uses.—Eberle and other writers state that the seeds are efficient as a diuretic remedy, and much in vogue among the country people, to relieve strangury from blisters and other causes, and also suppression of the urine. "They hardly ever fail," says Eberle, "to produce copious diuresis." The volatile oil which they contain renders them rather grateful to the stomach, and hence peculiarly applicable in authoric forms of drange connected with drangers.

asthenic forms of dropsy connected with dyspepsia.

Externally bruised carrot-root is frequently employed, as in ancient times, on account of its stimulating or cleansing influence upon foul ulcers. It was in 1768 that Gibson, in England, applied it to a cancerous sore of the penis, which it greatly amended, neutralizing the smell, and causing a complete separation of the dead parts, and a partial cicatrization of the sore. In other simple gangrenous sores it had the same effect, and promoted the cure. About the same time, Sultzer in Germany, and Bridault and others in France, employed it successfully under like circumstances. Many other writers might be mentioned, including Hufeland, Boyer, and Ricord, to vouch for its admirable qualities in the cases alluded to. We have long been in the habit of prescribing it for all descriptions of indolent and ill-conditioned sores, and most successfully for such as have been mentioned, and for those which discharge a thin sanious pus. The juice, used as a wash, is also said to afford great relief to itching in various cutaneous affections.

ADMINISTRATION.—The powdered seeds may be given in doses of from thirty to sixty grains. An infusion may also be made by adding half an ounce or an ounce of them to a pint of water, which may be taken during the day. The root may also be used in simple infusion, but it is more generally employed as an ingredient of broths, which it renders more directible and at the same time direction.

it renders more digestible, and, at the same time, diuretic.

PETROSELINUM. -- PARSLEY ROOT.

DESCRIPTION.—The root of Petroselinum sativum. Parsley is a native of Southern Europe and Asia Minor, but is now everywhere

¹ Lib. ii. cap. 52.

³ Med. Obs. and Inq., iv. 178, 191, 359.

⁵ Dubois, Plantes Usuelles, p. 22.

² EBN BAITHAR.

⁴ Dict. de Méd., iii. 658.

toms produced by it, as described above, are thought to be closely analogous to those of quinia, and accounts have been published of its curative virtues in intermittent fever and intermittent neuralgia, by Joret, Homolle, Dubail, and others. In amenorrhea, scanty menstruation, and dysmenorrhea the efficacy of apiol is very remarkable. The first two authors of those just named remark that, whether the object be to promote the primary establishment of the menses, to restore them when suspended, or to render them abundant when they are scanty and attended with pain in the pelvis, loins, and thighs, no medicine is more worthy of confidence than this. It need hardly be remarked that when the menstrual derangement depends upon constitutional causes these must first be removed by an appropriate treatment, as iron when anemia is present, purgatives and local depletion when a state of plethora or of uterine congestion exists; nor need it be added that apiol can be of little service if organic changes of the uterus or ovaries form the radical cause of the irregular, defective, or painful performance of the catamenial function.2 But these cases apart, we have found no medicine so certain in re-establishing the suspended flow or in causing its original appearance where this has been unduly delayed, provided, in most cases, at least, that some indications of a menstrual nisus existed.

ADMINISTRATION.—The powdered seeds may be given in doses of ten or fifteen grains. The root should be employed in the recent state, and generally in strong infusion. Apiol may be administered two or three times a day in doses of five or six drops inclosed in gelatin capsules.

TARAXACUM.—DANDELION.

Description.—The root, gathered in the autumn, of Taraxacum Dens-leonis, a native plant of Europe, but naturalized in almost every part of the United States. This root is fusiform, brown externally, and white within, and abounds in a milky juice. The leaves are radical, and serrated or toothed, whence the plant has derived its name of dandelion (dent-de-lion, lion's tooth). The flowers are of a golden-yellow color, composed of imbricated florets, and supported on a fistulous scape. They are succeeded by a hairy radiated pappus, or downy head.

The root should be gathered in the autumn and used while fresh, as its juice is then strongest. The medicinal virtues of the plant appear to depend upon a crystallizable bitter and acrid principle called taraxacin.

The following are officinal preparations of taraxacum:—

Infusum Taraxaci.—Infusion of Dandelion.

Two troyounces of bruised dandelion in a pint of boiling water, are

¹ Compare Joret and Homolle, Annuaire de Thérap., 1855, p. 180; ibid., 1856, p. 142; Bull. de Thérap., xlviii. 232; Brit. and For. Med.-Chir. Rev., Jan. 1857, p. 258.

² Consult Marotte, Bull. de Thérap., lxv. 295 and 341, for illustrative cases.

doubtful in my mind whether it ever does much good." We may unite in this doubt as far as regards diseases of an organic nature, but we entertain none in regard to its utility in cases of dyspepsia distinguished by obstinate constipation and a scanty or suspended secretion of bile, particularly when these depend upon sedentary habits or mental distress. It was under somewhat analogous circumstances that Wilson Philip strongly advocated its use. In acute dyspepsia, when the symptoms are mild, Dr. Todd advised it to be given associated with nitrate of potassa in some bitter or aromatic infusion."

In chronic pulmonary affections, included under the term phthisis by earlier writers, it has been very strongly recommended, and more recently Hufeland included it among the few and only resources to be depended upon in tubercular consumption. Even Sir James Clark wrote: "That a course of taraxacum steadily pursued for several weeks during the spring or summer will often produce a very beneficial effect." Indeed, when we consider the close relations of the lungs and liver as regards function, and the fatty degeneration which the latter undergoes in phthisis, we cannot but suspect that a substantial foundation exists for the opinions referred to.

ADMINISTRATION.—Decoction of dandelion may be given in the dose of a wineglassful two or three times a day. The dose of the infusion is the same. Both are exceedingly apt to ferment.

The extract is often rendered worthless by age. In its recent state the dose is from twenty to sixty grains, given in some aromatic water.

The fluid extract, or preserved juice of dandelion, is an excellent preparation. Its dose is one or more fluidrachms.

ERIGERON.—FLEABANE.

ERIGERON CANADENSE.—CANADA FLEABANE.

DESCRIPTION.—The single term Erigeron is now used to designate the herb both of E. heterophyllum and of E. Philadelphicum. The former is a biennial and the latter a perennial herbaceous plant; they are two or three feet high, with erect pubescent stems; ovate lanceolate pubescent leaves supported upon long footstalks; the flowers, which are in terminal irregularly branched corymbs, consist of a disk of yellow florets surrounded by delicate rays of a white or pale bluish color.

E. canadense is a larger plant covered with stiff hairs instead of down; its leaves are narrower, and its flowers smaller. Both species are found about old pastures and by the roadside. Fleabane has an agreeable aromatic odor, especially when bruised, and a somewhat astringent, bitter, and feebly acrid taste. These qualities are most

4 Cyclop. of Pract. Med., iv. 335.

¹ Lectures on Practice (1st Am. ed.), p. 750.

² Cyclop. of Pract. Med., ii. 653. ³ Médecine Prat. trad. de Jourdan, p. 345.

The leaves of buchu have a peculiar, strong and aromatic smell, a bitterish and warm taste resembling that of mint, and, when swallowed, excite a sense of heat in the stomach which diffuses itself over the body. Buchu augments the appetite, promotes digestion, quickens the pulse, favors the secretion of the skin, but still more that of the kidneys, causing a sediment in the urine and giving it an aromatic smell. Large doses produce vomiting and purging. These properties may be attributed to a volatile oil which the leaves contain in the proportion of seven per cent., and which has a strong odor and a very acrid taste, and also to a resinous matter which has been called diosmin. Buchu yields its virtues to water and to alcohol.

Extractum Buchu Fluidum.—FLUID EXTRACT OF BUCHU.

From sixteen troyounces of powdered buchu twelve ounces of tincture are first obtained by percolation with diluted alcohol, and separately, two pints more. The second product is then reduced by evaporation to four fluidounces, mixed with the first portion, and filtered. *Dose*, a fluidrachm.

Infusum Buchu.—Infusion of Buchu.

A troyounce of buchu is macerated in a pint of boiling water for two hours in a covered vessel and strained. *Dose*, one or two fluidounces.

HISTORY.—This medicine is derived from the Hottentots, who employ the bruised leaves as an application to recent wounds, and prepare with them an ointment which they use to anoint their bodies. They also use a vinous tincture which they procure by distillation, and consider a sovereign remedy for all chronic disorders of the stomach and bladder.¹ From them the Dutch settlers at the Cape learned the virtues of the plant, and carried a knowledge of them to Holland, whence they first became known to the rest of Europe. In 1821, Dr. Reece published an account of it in England. It was generally employed then as now for dyspepsia, and renal or vesical affections attended with unhealthy muco-purulent secretions.

Uses.—It is chiefly in chronic affections of the genito-urinary mucous membrane, accompanied with altered secretion, that buchu is prescribed, and these it frequently cures completely if they are independent of textural alterations. Thus it is often successful in putting a stop to the undue secretion of the mucous follicles of the urethra, the vesiculæ seminales, or of the prostate, produced by excessive venery or by a habit of self-pollution. But its benefits are still more decided in those cases of catarrh of the bladder which have supervened upon gonorrhæa, or upon the improper use of irritating injections. This affection, which often extends to the ureters, and may involve, even to disorganization, the kidneys themselves, producing great pain, mucopurulent discharge, incontinence or retention of urine, &c., is very successfully combated by the infusion or the fluid extract of buchu.

¹ Sigmond, Lectures, Lancet, 1837-8, ii. 828.

² McDowell, Med.-Chir. Rev., vi. 485.

Decoctum Uvæ Ursi.—Decoction of Uva Ursi.

This decoction is made with a troyounce of uva ursi boiled in a pint of water for fifteen minutes, strained, and sufficient water added through the strainer to make a pint. Dose, one or two fluidounces three or four times a day.

Extractum Uvæ Ursi Fluidum.—Fluid Extract of Uva Ursi. From sixteen troyounces of powdered uva ursi half a pint of tincture is first obtained by percolation with diluted alcohol, and afterwards and separately two pints and a half more. The second product is reduced by evaporation in a water bath to four fluidounces, and eight troyounces of sugar added to it while hot. It is then mixed with the reserved tincture, strained, and by a gentle heat evaporated to a pint. Dose, a fluidrachm.

HISTORY.—It is uncertain whether this plant was known to the ancients. In modern practice it would seem to have been first employed by Spanish and Italian physicians, who used it in calculous complaints about 1730-40. Its more general adoption dates from the writings of De Haen in 1756, and of Murray in 1764.

ACTION.—Uva ursi appears to promote the appetite and confine the bowels when given in small doses; in large quantities it has caused vomiting and purging. It does not display a very evident diuretic operation in a healthy state of the system, but in calculous disorders the urine appears to augment under its influence. Its astringent

principle passes off with this secretion, giving it a dark color.

Uses. Diseases of the Urinary Organs.—Murray recommended uva ursi in various cases of disease of these parts attended with a mucous, bloody, or purulent discharge, with painful micturition, or partial paralysis of the bladder.' He held that it caused the expulsion of calculi by augmenting the urine, and that it contributed to blunt the sensibility of the mucous coat of the bladder to the irritation of its contents, to cure chronic catarrhs of the urinary passages, and at the same time to diminish the pain and the frequency of urination. Haen says: "Persons who suffer from prolonged, obstinate, and copious suppuration of the urinary organs, without venereal taint and without evident signs of stone, are cured, and that permanently, by uva ursi alone." Even in calculous cases, he remarks, "the symptoms are often so completely palliated that pain in passing the urine or in retaining it is no longer experienced. In other cases of apparent cure the relapses have been cured by the same means, and that repeatedly. In other instances again the unfavorable condition of the patient prevented any improvement." According to Prout, it greatly palliates the symptoms, and Sir B. Brodie employed it with marked advantage in irritable states of the bladder, particularly when dependent upon disease of the kidneys.3 Clarus saw excellent results from its use in these affections.4 Ferriars gave it in a considerable number of nephri-

¹ Apparat. Med., ii. 76.

Bull. de Thérap., xlvii. 507. See, also, Med. Museum, i. 15, 89, 601, and ii. 335. ⁴ Arzneimittel., p. 282.

^{*} Waring, Manual of Thérap., p. 526. ⁵ Medical Histories (Am. ed.), p. 56.

CHIMAPHILA.—PIPSISSEWA.

DESCRIPTION.—Chimaphila umbellata, pipsissewa, or wintergreen (χειμα, winter, and φιλος, friend), is found in the northern countries of Europe and Asia, but more abundantly in the United States. It is a humble shrub of not more than from three to six inches in height, with lanceolate, serrated, dark-green, and coriaceous leaves in irregular whorls, and bearing white flowers tinged with red. The root is long, creeping, and yellowish. All parts of the plant are medicinal, but the leaves only are officinal. When fresh, they exhale a fragrant odor, which they lose on drying. Their taste is bitterish, astringent, and sweetish, and the roots and stems have, in addition, a marked pungency.

Decoctum Chimaphilæ.—Decoction of Pipsissewa.

It is prepared by boiling a troyounce of bruised pipsissewa in a pint of water for fifteen minutes, straining, and adding sufficient water to make the decoction measure a pint. *Dose*, two fluidounces.

HISTORY.—This plant was long in use among the aborigines of this country, and through them it became a popular domestic remedy. It was noticed by Schoepf, who described it as astringent and tonic; but the first detailed account of its properties is contained in the inaugural dissertation of Dr. Mitchell at the University of Pennsylvania in 1803. Less attention, however, was attracted by this essay than by a paper of Dr. Somerville, referred to below, and which was published in 1814. From the latter date the medicine has been extensively

employed, and its virtues are now generally recognized.

Action.—The bruised leaves sometimes produce redness, and even vesication, when applied to the skin, as Dr. B. S. Barton first observed. Internally, the plant is diuretic, tonic, and astringent. According to Somerville, its diuretic virtues are indicated by the name therbe a pisser, which the French Canadians gave to it. This writer, who observed them himself very unequivocally in several cases, says it generally increases the secretion of urine, and retains its influence on the kidneys for some time; it occasionally acts as a tonic, and in all cases is free from those offensive, and even deleterious, qualities which frequently interdict the application of some of the most powerful diuretics." Like uva ursi, it imparts a dark color to the urine, particularly when given in decoction or infusion. This effect is due to the tannin it contains. In other respects, too, it so closely resembles uva ursi, that the one medicine may be substituted for the other; but wintergreen is more acceptable to the stomach.

Uses.—Dr. Somerville found chimaphila very useful as a diuretic evacuant in several cases of dropsy which appear to have depended upon organic and incurable lesions, and he refers to similar cases which were treated by Satterley and Marcet. Chapman regarded it as distinguished for the activity and certainty of its diuretic operation,

Med.-Chir. Trans., v. 347.

Infusum Juniperi.—Infusion of Juniper.

To a troyounce of bruised juniper berries a pint of boiling water is added, infused for an hour in a covered vessel, and strained. Dose, two or three fluidounces.

Spiritus Juniperi Compositus.—Compound Spirit of Juniper.

This preparation is made by dissolving oil of juniper a fluidrachm and a half, and oil of caraway and oil of fennel each ten minims in eight pints of diluted alcohol. Dose, from two to four fluidrachms. It is an appropriate addition to the infusion of juniper, and that of other stimulant diuretics.

HISTORY.—It is probable that this medicine was known to ancient physicians, but the name under which it was described by them is now only a matter of conjecture.

ACTION. On Animals.—Some experiments by Semon upon rabbits with oil of juniper, gave the following results: An ounce destroyed a vigorous rabbit in about twenty hours, and the odor of the animal's secretions proved that the oil had been absorbed. The symptoms produced resembled those from oil of turpentine. The heart beat quicker and harder and then by degrees more feebly; the breathing grew more rapid and labored; there was diuresis and diarrhoea, and finally death by exhaustion. The bowels and kidneys exhibited a

congested state, but no inflammation.

On Man.—Juniper is stomachic and carminative, in virtue, probably, of its volatile oil and resin, and is found to stimulate the appetite and digestion. In large doses it is said to quicken the circulation, and at the same time to augment the cutaneous transpiration and the urine, to the latter of which it gives, like turpentine, an odor of violets. According to Alexander, the oil of juniper is a very active diuretic. The specific operation of the powdered berries upon the kidneys is so decided that their continued employment has occasioned bloody urine.3 They are also reputed to possess emmenagogue properties. Oil of juniper applied to the skin, and allowed to evaporate, produces a slight and transient redness, but no vesication; but it is apt to blister if prevented from evaporating.

Uses.—Juniper augments the urine, and acts as a healthful stimulant in chronic affections of the bladder, and particularly when the tone of this organ is impaired, inducing retention of urine. In chronic vesical catarrh, and in gonorrhæa and gleet, it has been used with success. Its advantages are particularly apparent when the urine as well as the cutaneous transpiration are diminished by cold, or by inactive or sluggish habits of life. Under these circumstances, according to Richter, it prevents the development of cutaneous eruptions, and of abdominal derangements which may eventuate in organic disease. Its diuretic and healing qualities become very useful in cases where sabulous matter and small calculi are passed with difficulty, or create by their presence a mucous or purulent secretion from the urinary passages.

Several writers have extolled juniper in dropsy. Richter praised it

MITSCHERLICH, Lehrbuch, ii. 266.

Piso, in Murray, App. Med., i. 49.

² Experimental Essays, p. 151.

Ausfürlich. Arzneim., ii. 108.

formula is that which he considered the best: R.—Oil of cade [3ij; glycerin f3v; solution of subacetate of lead f3j.—M. S.—To be rubbed over the affected part every night. When the disease affects a large surface, a mixture of one part of oil of cade to seven or eight parts of cod-liver oil, or lard oil, may be substituted for the glycerin

compound.

The oil is sometimes applied pure, and in that case the slightest possible film is laid upon the affected part, but not oftener than once in from two to four or five days. This mode of application is the best, but if an ointment is preferred, it may be made as above described, or according to Dr. Erasmus Wilson's formula: R.—Oil of cade 3j; suet 3vj; lard 3ij. Melt with a gentle heat to make an ointment.

COPAIBA.

DESCRIPTION.—Copaiba is a resinous exudation obtained from Copaifera multijuga and other species of Copaifera, which grow in Brazil. It is described as a lofty and elegant tree with a dense canopy of foliage. The leaflets are in pairs of from two to ten, and are more or less elliptical in shape. The flowers are whitish and in terminal branched spikes. The fruit is an oval pod containing a single seed.

The juice, which is exceedingly abundant, is obtained by means of incisions made in the stems of the tree. It is a clear transparent liquid, of an amber color, and of about the consistence of olive oil. Its odor is aromatic, and at first rather pleasant; the taste is hot, bitter, and nauseous. It is insoluble in water, but dissolves entirely in ether, alcohol, oils, and strong alkaline solutions. It forms with alkalies, a kind of soap which is insoluble in water. With one-sixteenth of its weight of magnesia, it forms a solid mass which has been used to form pills. It consists of about forty-five per cent. of resin, or copaivic acid, and about thirty-four per cent. of volatile oil, according to its age and exposure to oxidation in the air. The oil, when perfectly fresh, is colorless, but becomes greenish by being kept. It is soluble in alcohol.

The officinal preparations of copaiba are these:—

Oleum Copaibes.—OIL OF COPAIBA.

This oil is procured by the distillation of copaiba and water. Dose, ten or fifteen drops.

Pilulæ Copaibæ.—Pills of Copaiba.

Two troyounces of copaiba are mixed with sixty grains of magnesia, and set aside to concrete, when it is divided into two hundred pills. They ultimately become quite brittle.

HISTORY.—The earliest account of copaiba is that which was furnished by Piso, in 1648. This writer says that it cures leucorrhoea, diarrhoea, and gonorrhoea, and he refers to injections of it in the last named disease. Marcgrave, who wrote at the same period, speaks of

Boston Med. and Surg. Jour., April, 1859, p. 215.

stomach, and they indicate that it is no longer acting favorably upon the disease. Indeed, Ricord states that it is not uncommon to see patients in whom the running, after having been dried up, reappears

along with the cutaneous eruption.

As regards the action of copaiba upon the nervous system, it may be stated that Ricord met with cases in which too large a dose, or the untimely administration of the medicine, occasioned alarming symptoms. In one temporary hemiplegia was produced, which ceased upon the occurrence of a rubeolar eruption; and in another an attack of convulsions terminated in like manner. Maestri observed a case in which large doses of copaiba produced rigidity of the muscles of the trunk, and partial paralysis of the facial muscles.'

Oil of copaiba acts very much as copaiba itself, but less powerfully. According to Mitscherlich, it is poisonous to rabbits in doses of an ounce or more. The symptoms produced by it are hurried breathing, and palpitation of the heart, restlessness, frequent micturition, loose alvine discharges, which at last become mucous and bloody, and at last death by asthenia. The gastro-intestinal mucous membrane after death does not exhibit inflammation, but only a partial destruction of the epithelium. Upon the human skin this oil acts very feebly as an irritant. When taken internally it is excreted with the urine, from

which it may be precipitated by muriatic acid.

Gonorrhæa.—As already noticed, the use of copaiba in gonorrhœa dates from the introduction of the medicine into Europe, and seems to have been borrowed from the natives of South America. But it was first brought into more general use in the last century by Hunter and by Swediaur. The method of these physicians was not calculated to abridge very much the duration of the disease, for they employed the remedy very seldom before the natural period of its decline. In this, too, Cullen agreed with them, and the greater number of English practitioners of the present day adopt the same temporizing method. It undoubtedly succeeds, but only by a tedious A different method is generally to be preferred whenever the inflammatory symptoms are not severe. In 1804 a patient of Ribes, of Paris, took by mistake an ounce of copaiba at a single dose. was purged, suffered colic, and loss of appetite, but the gonorrhœa he labored under was cured. In 1812 Ansiaux adopted the plan of giving Chopart's mixture' from the very beginning of the attack, and found that it often produced a speedy cure. In English medicine the first trace of the new method is contained in the writings of Armstrong (1818), who states that he adopted it on the suggestion of Dr. Dawson, who had followed it for several years. Armstrong employed the remedy in the very first stage of virulent gonorrhoea, and he concluded from his own experience that it would not fail once in twenty times completely to arrest the progress of disease, provided it be given in

¹ Prag. Viert., lxii. Anal. 98.

² Mat. Med., ii. 192.

R.—Mint-water, alcohol, copaiba, syrup, a Zij; spirit of nitric ether Zj; orange-flower water Zij.—M. S.—Two tablespoonfuls in the morning, one at noon, and one at night; and continue for twelve days.

Dict. de Méd. en 60 vol., vi. 240.

why it is that in females vaginal gonorrhoea is so much more difficult to cure than urethral; for in the former the copaiba does not come directly in contact with the diseased parts. Some experiments have been tried to cure the disease by injecting emulsions of copaiba into the urethra, as Piso did two hundred years ago; but they have usually failed, because, probably, the urine remains unmodified, and irritates the inflamed part in its discharge. Marchal made use of injections of the pure balsam, of an emulsion containing it, and of bougies smeared with it. His success does not appear to have been very great. Mr. Dallas, of Odessa, used several times a day injections of the following emulsion: R.—Copaiba 3v; yelk of egg No. j; extract of opium gr. j; water 3vij; and is stated to have employed it, without any other remedy, with complete success.

The disgust which patients are apt to acquire for copaiba led Velpeau to try its administration by the rectum. He used it in doses of two drachms at first, which were gradually increased to six drachms, made into an emulsion with a small proportion of laudanum added, taking care that the bulk of each dose should not be sufficient to induce its expulsion, or to cause burning by its contact with the anus. The treatment was successful in nearly all of the cases, but neither so speedily nor so often as the ordinary one. Ricord admits the occasional efficacy of this method, but affirms that the medicine is ten times more certain to cure when given by the mouth. Ratier used, instead of injections, copaiba capsules introduced into the rectum beyond the

sphincter, after well anointing the part.

Vesical Catarrh.—Numerous authors, including Hoffmann, Bretonneau, Barbier, Delpech, and Dr. La Roche, have found copaiba very serviceable in the treatment of this affection. According to Dr. La Roche, moderate doses are the most successful, because they agree better with the stomach, and can be continued for a longer time. He also advised that the medicine should be occasionally suspended, in order to allow the stomach an opportunity of recruiting, and to prevent the risk of too constant an irritation of the affected parts. Other physicians (Souchier, Dévergie, Pidoux) employed injections of copaiba into the bladder in these cases, even to the extent of two ounces, with a like quantity of barley-water, and, as it would seem, successfully.

Some writers have thought that copaiba, when given freely, disposes to hernia humoralis; but Ribes asserts, on the contrary, that nothing so soon reduces engorgement of the testicle, and that its use renders quite unnecessary all local applications, and even a suspensory bandage. Delpech made a similar observation. Although these results, and some general considerations that might be adduced, seem to favor the method, it does not appear to have been much employed, perhaps because it seemed more hazardous than it really is. Armstrong found copaiba very beneficial in some cases of simple leucorrhea, that

¹ RANKING'S Abstract (Am. ed.), xv. 166.

Brit. and For. Med.-Chir. Rev., July, 1856, p. 265.

Bibl. de Thérap., i. 383. Am. Jour. of Med. Sci., iv. 13.

⁶ TROUSSEAU and PIDOUX, Thérap., ii. 619.

⁶ Practical Illustrations, &c. (Am. ed.), p. 558.

Copaiba has been used with oil of amber and oil of turpentine to cure nocturnal pollutions depending upon debility of the sexual organs; also in chronic irritability of the bladder depending upon anterior gonorrhœa and excessive venery. Labat (1740) recommended it as having proved an efficient remedy for intermittent fever during an epidemic of this disease at Nantes. M. Hardy found the internal use of large doses of copaiba advantageous in some cases of psoriasis.¹

As a local application, copaiba was formerly used as a dressing for wounds and sores, whence its popular name of balsam. In recent times Sachs recommended it strongly as an application to the sore nipples of nursing women. He assures us that if used before there is an absolute loss of substance, but only increased tenderness and commencing abrasion or fissure, it will arrest the evil. He directs it to be applied upon fine linen compresses, which, if they adhere, can be removed by moistening them with the balsam; and also that the nipples should be washed with warm milk before the child is allowed to nurse.² Dr. Ruschenberger advises it as an application to chilblains, for which, like other terebinthinate stimulants, it is an excellent remedy.

ADMINISTRATION.—Copaiba may be given pure floated upon the surface of water, on which a few drops of tincture of gentian are then poured; or inclosed in gelatinous capsules; or solidified by magnesia; or in emulsion prepared with mucilage or yelk of egg and some aromatic water, to which a few drops of laudanum may be added if the bowels are relaxed. Equal quantities of copaiba and solution of potassa make a perfect solution, which can be diluted and flavored according to the requirements of the case. This is an eligible method, when small doses only are to be given. The dose will vary, according to circumstances, from ten drops to nearly an ounce in twenty-four hours; but the latter quantity should be reached gradually, and given only where the medicine is thoroughly tolerated.

The oil of copaiba may be given in doses of from twenty drops to one or two fluidrachms. It may be taken on a lump of sugar or in emulsion.

CUBEBA.—CUBEB.

DESCRIPTION.—Cubebs are the dried berries of *Piper cubeba*, a climbing perennial plant which grows wild in Java and the Indian Archipelago. They are of about the size of a small pea, of a blackish-brown color, rough, and furnished with a small footstalk. The shell is woody, and contains a hard, round seed, which is white within and oleaginous. They have an aromatic odor and a warm, peppery, and camphoraceous taste, and contain about ten per cent. of an essential oil, besides cubebin, resin, &c. The oil is transparent and colorless; it has a specific gravity of 0.929, the characteristic odor of the berries, and a hot, aromatic taste. Cubebin, when pure, is without

¹ Bull. de Thérap., lii. 268.

² Handworterbuch, &c., I. Abth., II. Theil, S. 303.

which, we may remark, that a sense of warmth is felt about the rectum), imparts to the urine its peculiar odor, and augments its quantity. Now and then it causes flushing of the face and a burning heat in the palms of the hands and the soles of the feet. Its continued use does not appear, like that of copaiba, to derange the digestive function and destroy the appetite. On the contrary, it tends rather to strengthen them; and hence it may be advantageously substituted for copaiba when that medicine is not tolerated. An attack of partial paralysis of the face following the use of cubeb has been attributed to this medicine. Crane noticed that it sometimes appeared to increase the venereal excitement and a sense of heat about the rectum and perineum. More recently, Clarus assures us that when given in the inflammatory stage of gonorrhoea it may occasion violent inflammation of the neck of the bladder.3 Crane further remarked that it occasionally produced mental irritation and anxiety, and, if the dose was too large, nausea and vomiting. These effects resemble those observed by Pul in experiments upon himself. He found that doses of a drachm only caused some thirst and heat in the throat, two drachms slight feverishness, and three drachms nausea, eructation, heat at the epigastrium, headache, malaise, and an ephemeral fever. A singular view of the medicine's operation is taken by M. Dieu,* who alleges that its action is sedative, and is curative because it is sedative. In support of this notion he cites several cases of gonorrhoea, cured by cubebs, in which, during the progress of the cure, the pulse fell from 70 to between 40 and 50. But he neglects altogether the influence of rest, low diet, and the subsidence of pain and inflammation, which suggest themselves as the more probable causes of the alleged phenomena.

An eruption resembling urticaria is sometimes produced by this medicine, as it is by copaiba. Several cases of the sort—and the first, it is believed, on record—were reported by Mr. Crane in 1832. A case was observed by Dr. Cazentre, of Valparaiso, of death attributed to cubeb. The symptoms were congestion of the face, dilated pupils, insensibility, a slow, feeble, and irregular pulse, and rattling respiration, and the lesions consisted of vascular engorgement of all the great viscera, and of the right side of the heart. Such effects naturally suggested a doubt as to the character of the powder taken; and subsequently, on being analyzed by Mr. Procter, of Philadelphia, it was

found to contain thirty per cent. of opium.

The action of oil of cubeb upon rabbits has been studied by Gödecke. He found that in the dose of an ounce it acted poisonously upon these animals, and produced symptoms like those of the essential oils generally, and especially like that of copaiba, but more strongly characterized. It penetrates the urinary organs and the peritoneum,

Lond. Med. Gaz., i. 405. Edinb. Med. and Surg. Jour., xxi. 302.

Speciell. Arzneim., p. 728.

MITSCHERLICH, Lehrbuch, ii. 240.

Lond. Med. and Phys. Jour. (N. S.), xii. 195.

<sup>Am. Jour. of Med. Sci., April, 1833, p. 304.
Clarus, op. cit., p. 727.</sup>

might arise from "a counter-irritation incompatible with the inflammatory excitement arising from the disease."

Of leucorrhæa several cases were reported by Dr. Orr, cured in a short time by cubeb, in the dose of a drachm and a half three times a day. Dr. Traill, also, and Dr. Crane, gave it with equal advantage. Velpeau reports the cure of several in which enemata of cubeb were thrown into the bowels.

Trousseau has called attention to the usefulness of cubeb in irritability of the urethra in females. This annoying ailment, which is sometimes met with in young girls, but more frequently in married women, is attended with an almost constant desire to urinate, severe smarting as the water is evacuated, and afterwards tenesmus of the bladder. At the same time there are pains in the loins and a sense of weight in the pelvis. A slight discharge of mucus, which is sometimes bloody, may precede or follow urination. For this distressing affection cubeb is the most successful remedy, administered twice a day at meal times in doses of from thirty to sixty grains, and continued in diminished quantities for several days after the cessation of the symptoms. A somewhat analogous affection is occasionally observed as a consequence of blistering with cantharides, even where strangury has not occurred as the immediate effect of the treatment; it is also removable by cubeb. Nocturnal incontinence of urine, which is generally perpetuated by irritability of the neck of the bladder, has been cured by the same medicine.

Debout has particularly called attention to the efficacy of cubeb in certain nervous disorders. It was formerly supposed to be a remedy for "nervous headache, vertigo, apoplexy, paralysis, and loss of memory." Richter mentions that hysterical women make use of a confection of cubeb to cure the vapors, fainting, &c. The particular condition which appears to have been beneficially modified by this medicine consists of occasional vertigo with nervous debility and partial loss of muscular power simulating the commencement of paralysis from central disorder of the brain, such as is frequently occasioned by excessive mental emotion or intellectual labor, and is associated with dyspeptic derangements. He advises its administration in doses of from eight to thirty grains twice a day when the digestion only is deranged; but that the quantity suited to combat the vertiginous affection should be at least one hundred and fifty grains a day, in two or three doses, taken at meal times.

In chronic cystitis Brodie recommended small doses—fifteen or twenty grains—to be given three times a day. He found that they palliated the symptoms.

Cubeb may also be employed in chronic and atonic pulmonary catarrh. Indeed, owing to its stimulant action upon the stomach, it may become more serviceable than copaiba in cases of the disease attended with feeble digestion.

¹ Edinb. Med. and Surg. Jour., xviii. 318.

³ Ibid., xxi. 304.

⁵ Bull. de Thérap., lxi. 18.

⁷ Ausfürl. Arzn., iii. 130.

² Ibid., xvii. 312.

⁴ Archives Gén., xiii. 54.

⁶ Ibid., lxi. 56.

⁸ Lond. Med. Gaz., i. 300.

of muriatic acid to an aqueous solution of the active principles of the cormus. It is intensely bitter, neutral, insoluble in water and soluble in alcohol and ether.

The following are officinal preparations of colchicum:—

Acetum Colchici.—VINEGAR OF COLCHICUM.

This preparation is made by macerating two troyounces of bruised colchicum root for seven days in two pints of diluted acetic acid. It may also be procured by percolation. Dose, from thirty drops to two fluidrachms.

Extractum Colchici Aceticum.—Acetic Extract of Colchicum. This extract is best prepared by percolation. Twelve troyounces of powdered colchicum root are exhausted by means of four fluid-ounces of acetic acid diluted with water, and the resulting liquid is evaporated to a proper consistence. Dose, one or two grains, and gradually increased.

Extractum Colchici Radicis Fluidum.—Fluid Extract of Colchicum Root.

From sixteen troyounces of powdered colchicum root twelve fluidounces of tincture are procured with alcohol and water; this product is set aside until two pints more of tincture are obtained, which are then mixed with the reserved tincture, and the whole is evaporated to four fluidounces. Dose, ten minims.

Extractum Colchici Seminis Fluidum.—Fluid Extract of Colchicum Seed.

It is procured by the same process as the fluid extract of the root. Dose, ten minims.

Tincture Colchici.—TINCTURE OF COLCHICUM.

This tincture is prepared with four troyounces of bruised colchicum seed and enough diluted alcohol to produce two pints by percolation. Dose, from half a fluidrachm to two fluidrachms.

Vinum Colchici Radicis.—WINE OF COLCHICUM ROOT.

Twelve troyounces of powdered colchicum root are treated with a sufficient quantity of sherry wine, and two pints of filtered liquid are obtained by percolation. Dose, from ten minims to a fluidrachm, repeated several times a day.

Vinum Colchici Seminis.—WINE OF COLCHICUM SEED.

This wine is prepared by macerating four troyounces of powdered colchicum seed in two pints of sherry wine for fourteen days, expressing the residuum, and filtering the liquor. Dose, half a fluidrachm to a fluidrachm three or four times a day.

HISTORY.—Dioscorides describes this plant under the names of colchicum, ephemerum, and wild bulb, and states that it abounds in Messenium and in the isle of Colchos. Its poisonous effects, he says, resemble those produced by mushrooms, and he proposes milk as the best antidote for them.¹ Galen alludes to its poisonous qualities. Paul of Ægina, who flourished in the next century, speaks of hermodactylus (which Mr. Adams, in common with Bergius, Tournefort, Geoffroy,

ACTION. On Animals.—In estimating the activity of colchicum, the variable strength of its preparations must be kept in view. This often depends upon the cormus having been gathered at a season when it is nearly inert. As before remarked, it is most active in July and August; the seeds are of more uniform strength, and the flowers and leaves are feebler. The plant is poisonous to most herbivorous animals, and is generally avoided by them when grazing. But it is sometimes eaten among their fodder, and then it may produce bloody flux, and death, with inflammation of the bowels. Haden mentions its purging a horse violently. Given to dogs by Störck, it caused vomiting, trembling of the limbs, convulsive movements of the belly, howling, diuresis, bloody stools, prolapse of the rectum, and death. From the peculiar severity of the symptoms caused by colchicum in dogs, the French call it mort au chien. Braun describes as follows the effects produced in six cows that had eaten of the colchicum plant. There was loss of appetite and thirst; chewing of the cud was suspended; diarrhæa of a thin, whitish liquid took place; the anus gaped; there was a frequent and feeble pulse; running of the eyes and nose; dulness of the senses; distension of the belly, and scanty urine; the hair stood erect and rough; and there was tenderness on pressure over the maw. One of the cows and a calf died; the lining membrane of the intestine was found injected and red, and the blood dark and liquid.2 The action of colchicum upon certain animals is very feeble. As much as six and a half drachms of the wine of the seeds was given by Lewins to a rabbit in the course of four days, with very little effect beyond acting upon the kidneys. On frogs its influence is equally slight. Some experiments upon them show a singular insusceptibility to the action of the medicine. It caused, indeed, a disposition to vomit, weakness, some convulsive movements, and tetanic rigidity; but the animals recovered from doses which are fatal to large dogs.

Forty drops of the wine of the seeds were given to a cock, without evident effect. On the next day eighty drops produced dulness and loss of appetite; one hundred and twenty drops causing vomiting of mucus, and copious watery dejections, with extreme debility and depression; the next day one hundred and eighty drops reproduced these symptoms, and destroyed the animal within twenty-four hours. Its intestine was filled with half-digested food, and showed spots of vascular injection. Lewins' gave seventy minims of the wine of the seeds to a middling sized dog. No distinct symptoms were observed within six hours, but at the end of sixteen hours it was found that the animal had vomited and been purged, and that the egesta contained blood. He lay prostrate and motionless, refused food, and his eyes were glazed and sunken; he died without any reaction. The intestines were found to be everywhere injected, the jejunum and ileum were intensely red, and the whole bowel was lined with bloody serum and thin mucus.

Sir Everard Home injected one hundred and sixty drops of a

¹ Murray, Apparat. Medic., v. 198.

Frank, Mag. für Arzneim., iii. 143.

Edinb. Med. and Surg. Jour., lvi.

small ones. The following description comprises the most usual and

important of these effects.

The nervous system is seldom disturbed by medicinal doses of colchi-In a large series of cases reported by Monneret, although the digestive functions were much deranged, those of the nervous system were unimpaired. Kuhn, however, observed headache and vertigo among the effects of the medicine. Some writers ascribe a narcotic virtue to this medicine, as confusion of the mind, giddiness, sopor, and delirium (Schroff); and others, besides these symptoms, describe buzzing in the ears, a yellowish haze before the eyes, formication in various parts of the body, dyspnœa, palpitations, &c. Probably most of these phenomena arise from the rapid exhaustion produced by colic, vomiting, and purging. Sir Everard Home seems to have been the first to notice the property of colchicum to diminish the frequency of the pulse (1816). Dr. A. T. Thompson also drew attention to this phenomenon, which is unquestionably one of the physiological effects of the medicine. In this country it was early noticed by Dr. J. Y. Clark.3 It ceases as soon as the poisonous action begins. Dr. Maclagan took twenty minims of tincture of colchicum on two different days, between the hours of six and eight in the evening, and found that by midnight his pulse had fallen to about 65.

When applied to the skin, the fresh cormus is said to cause redness and prickling, with diminished sensibility. The powder, if inhaled, excites sneezing and coughing. Upon the tongue it produces an acrid, bitter, and astringent taste, with irritation of the fauces, and salivation. Sachs found that chewing the bulb occasioned irritation, pain, and tension, followed by insensibility and rigidity of the tongue. Dr. R. J. Buckner reports a case in which copious ptyalism was attributed to colchicum given in doses sufficient to produce vertigo and a burning heat in the fauces and stomach. Dr. Aldridge refers to three cases in which profuse ptyalism resulted from the use for some time of half

a drachm of tincture of the seeds three times a day.

The action upon the digestive organs is more uniform and distinct. When small doses of colchicum have been used for several days in succession, or a pretty large dose has been taken at once, some heat is felt at the epigastrium, with eructations, and perhaps nausea. If continued, the appetite fails, the tongue becomes coated, there is some colic, with borborygmi and diarrhea. Still larger doses excite vomiting and purging. Monneret, who gave from one to four drachms of the tincture to rheumatic patients in the course of twenty-four hours, found that its most uniform effects were nausea, vomiting, borborygmi, colic, and diarrhea. The vomited matters were usually bilious, the tormina and tenesmus were sometimes severe and incessant, with heat and smarting of the anus, and dysenteric stools. That is to say, the dejections, after being colored with bile, became serous, and contained white specks, yellowish and bloody mucus, a solid reddish substance (fibrin?), and some blood. In fact, they had the chief characters of

Loc. inf. cit.

³ Phila. Med. Recorder (1818), i. 369.

⁵ Dub. Hosp. Gaz., Oct. 1845.

² Archives Gén., xvii. 393.

⁴ N. Am. Med. and Surg. Jour., x. 205.

⁶ Archives Gén., Mars, 1844.

salivation. Within two hours, the pulse fell eleven pulsations. Eight hours afterwards, two one-hundredths of a grain were taken in a wafer. At the end of six hours the experimenter, being in bed and asleep, was awaked with a desire to go to stool, and, on rising, vomited for two minutes, and had a soft and copious stool, with violent griping. These symptoms returned some hours afterwards, and the stools were mucous, and of a greenish-yellow color. They did not immediately recur, but there was complete anorexia for several days, during which the stools were thin, flocculent, and albuminous, and accompanied with griping, and tenderness of the abdomen, with thirst, fever, accelerated pulse, cerebral distress, agitation, and want of sleep. The urine

was thick, and gave a copious white deposit.1

In poisonous doses, colchicum gives rise to symptoms of a very violent description, which are apt to terminate in death. The following is a summary of results from an analysis of ten cases which are reported in sufficient detail for our present purpose.2 The forms of the medicine were various, including the tincture, the seeds, the infusion of the bulb, and the leaves. The quantity of the alcoholic preparation always exceeded an ounce, and was generally between one and two ounces. The patients were all adults except two, who were boys of four and six years old. Pain in the abdomen is described in about half the cases, but not as very severe in more than two; its character was usually griping. It was generally one of the first symptoms to appear, and occurred at various intervals from half an hour to an hour after the poison had been taken. Sometimes it was spasmodic, and accompanied with cramps of the abdominal muscles. The epigastrium is said to have been slightly tender upon pressure in one case, and in two is expressly stated to have been indolent; in the rest, this symptom is not mentioned, and must, therefore, be supposed to have been Vomiting was a prominent symptom in every case; it occurred among the earliest symptoms, and was the most persistent of them all; the fluids thrown up consisted of bile and mucus, sometimes tinged with blood; in one case, a substance like coffee grounds was rejected.

¹ Compare Brit. and For. Med.-Chir. Rev., Jan. 1858, p. 249; and Prager Viertel-jahrschrift, liii., Anal., p. 5.

^{*} Compare Henderson, Lond. Med. Gaz., xxiv. 762; Leroy des Barres, Bull. de Thérap., xxxiv. 498; Feriday, Lond. Med. Gaz., x. 161; Neubrandt, Maclagan, Mém. cit.; Dillon, ibid.; Schilling, Frank's Mag. für Arzneim., ii. 139; Santlus, ibid., ii. 393; Ollivier, ibid., iii. 138; Andrea, ibid., i. 42; Bleifuss, Strumpf's Handbuch, ii. 485.

Other cases may be alluded to which were not at hand when those above were analyzed. See an article by Casper, relative to four fatal cases of colchioum poisoning (Vierteljahrschrist für gerichtliche und öffentliche Medicin, vii. Bd. 1, Hest.), in which he demonstrates the mode of obtaining colchicin from the contents of the stomach in cases of poisoning by colchicum, and concludes that less than half a grain of this principle is sufficient to destroy life. M. Roux has published an account of the death of five persons in the infirmary of the prison of Toulon, who died from the effects of about two ounces of the wine of colchicum seeds administered to each of them by mistake. (Union Méd., and Prager Vierteljahrschrist, xlviii., Anal., p. 3.) A case in which one ounce of the wine of the seeds was taken in the course of twenty-sour hours, without a satal result, is reported by Dr. Kennard. (Am. Jour. of Med. Sci., Jan. 1857, p. 69.) For later cases, vid. Am. Med. Times, v. 339; Med. Times and Gaz., Oct. 1860, p. 420; Casper's Vierteljahrschrist, xvii. 1; Henke's Zeitschrist, lxxxiv. 202.

described as purple, livid, violet or greenish upon the back and sides, and there would seem to have been a tendency to rapid decomposition of the body. The lungs and brain were gorged with dark, imperfectly coagulated, and pitchy blood, and so were the veins of the trunk. The gastro-intestinal mucous membrane is generally described as inflamed, but, on closer inquiry, it seems rather to have been intensely congested in the stomach and small intestine, and in some situations to have lost its normal consistence. In perhaps one-fourth of the cases, its color was normal. Not unfrequently, ecchymoses were found in the submucous cellular tissue, and in several cases the vascular congestion extended to the peritoneal coat. In one case only, there was no congestion at all.

The duration of the fatal symptoms seems not to have exceeded forty-eight hours in any case where the result depended directly upon the poison. The shortest period which it required to prove fatal in

the adult was twenty-four hours.

In man, as in the lower animals, we may learn from the preceding statements and analysis, that colchicum expends its force upon the digestive organs and upon the nervous system, while at the same time it probably favors the elimination of solid effete matters from the economy by the bowels, the kidneys, and to some extent also by the skin.

In Gout.—In this country colchicum was early used as a remedy for gout by Dr. Dorsey, who found the joints "were relieved by it as by the wand of a magician." He believed that it promoted sleep, and observed that it purged away dark fetid matter. In England Dr. Barlow (1822) strongly advocated its use, but insisted upon premising depletion and purgation with calomel and antimony. directed two drachms of the tincture of the seeds at night, and, if necessary, a repetition of the dose the next morning, so as to purge briskly. If this effect was not produced, a similar dose was prescribed the following night, after which the medicine was continued in smaller quantities and given in a saline mixture. Thus employed, he found that it purged, allayed the pain, and lowered the pulse. But he regarded its sedative more than its cathartic operation. Sir H. Halford also gave it in conjunction with saline laxatives when the bowels were not already open; but he does not appear to have considered its purgative operation essential to its curative effects, for he states that it often cures the disease without any manifest increase of the secretions, though it sometimes acts as a diuretic and sometimes as a diaphoretic. Nor does he subscribe to the notion that the medicine is of little value because its effects are temporary, for, as he remarks, none other does even as much; and he denies that it renders the disease more apt to return, as ancient authors declared and some modern ones maintain.3 Dr. Holland also dissents from this opinion, maintaining that, on the contrary, it may with due care be made a preventive as well as a curative agent. There is no doubt that the certainty with which

Am. Med. Recorder, i. 376.

^{*} Essays and Orations, p. 101.

Cyclopædia of Pract. Medicine, ii. 371.

⁴ Notes and Reflections (1st Am. ed.), p. 89.

emeto-cathartic operation in the treatment of gout. We have met with but one notable exception to this statement, that of Dr. Wigan, of Brighton, who, it must be added, has reference more particularly to "rheumatic gout." In this affection he pronounces colchicum to be "the most easily managed, the most universally applicable, the safest, and the most certain specific" in the Pharmacopœia. He employs the powdered cormus in doses of eight grains every hour in some mild and agreeable fluid, until active vomiting, profuse purging, or abundant perspiration takes place. These effects are postponed as long as possible by giving the patient an occasional sip of some aromatic and stimulant drink, and generally until six or seven doses have been His condition then resembles sea-sickness, and, like it, is very distressing, but when it has been endured for a few hours, the inflammation of the joints subsides and they resume their natural size with miraculous rapidity. A sound sleep ensues, "from which the patient awakes perfectly well." Dr. W. affirms that he has never seen a relapse. It is possible that the administration of the medicine in divided doses may prevent the serious consequences otherwise to be apprehended from such heroic treatment.

Rheumatism.—The views of some among the more prominent advocates of colchicum in this disease may serve to show the nature and extent of its power. After Haden's publication in 1820 the medicine began to be tried as a remedy for rheumatism. Locher-Balber reported that it cured the acute disease surely and rapidly whenever it purged, but that it deranged the digestive organs temporarily. About the same time were published the observations of Bart, Williams, Bang, of Copenhagen, Kirchow, Bushell, and Godart.3 The last-named writer pointed out the sedative action which the medicine unites with its purgative operation, or exerts independently of the He particularly described a prickling sensation with warmth which was felt by the patients in the affected limb, and which seemed to promote is power of motion. Afterwards Kuhn published several cases in proof of its efficacy, and in 1830 a complete history, natural and medical, of the drug, in which he alludes to the diminished pain and stiffness produced by colchicum, and attributes them to a temporarily blunted sensibility rather than to an improved condition of the part, for the pains, he says, return if the medicine is suspended. Armstrong soon afterwards pronounced a more favorable judgment. In acute rheumatism, he says, "it certainly has given more speedy and decided relief than any other single remedy which I ever saw employed." In doing so, he adds, it did not act through the kidneys or skin, and but occasionally on the bowels, but it lessened the heart's action, the animal heat, and the pain. Dr. A. T. Thompson expressed a similar opinion, but he only prescribed the medicine after calomel, tartar emetic, and opium. Seymour gave an equally favorable verdict, but similarly qualified. Chailly held it to be successful, but

¹ Lond. Med. Gaz., xxii. 576. ² Revue Méd., xix. 135, 1825.

Archives Gén., xii. 602, 1826.

⁴ Archives Gen., xvii. 393; Revue Méd., xxxix. 5, 191.

Practical Illustrations (Am. ed.), p. 237.

⁶ Lancet, 1834-5, ii. 73. Med.-Chir. Rev., xxxiii. 659, 1838.

Kuhn, like Chelius, dwelt upon the value of the rheumatism.1 remedy in removing uric acid from the system in gout, and thus contributing to prevent the concretions which are so apt to form upon gouty joints. Dr. Lewins (1841) maintained that it promoted the evacuation of urea as well as of uric acid.* Dr. Holland's remarks there is every reason to believe that colchicum neutralizes or eliminates a gouty materies morbi (he does not attempt to pronounce upon its nature) from the system, for whenever the gouty inflammation manifests itself in the foot, in the bronchi, the eyes, or the head, producing a peculiar form of headache, the specific virtues of the remedy are equally apparent. Moreover, the early suspension of the medicine is apt to be followed by a renewal of the symptoms, as if its depurative action had not been completed. The attempts made to explain this operation have not been remarkably successful. Thus, Mr. Headland, after proving that colchicum acts upon the blood, remarks: "This hæmatic action must be of a catalytic kind, and may probably consist in the exertion of a special influence over the erring assimilative processes, which tends to resolve them into a right direction."4 It can hardly be said that these phrases do much to lessen the obscurity of the question.

It has also been maintained that the augmented secretion of solids through the kidneys depends less upon the direct action of colchicum, than upon the sedative power which it exerts over the circulation, and which permits the discharge of matters, which in a state of greater vascular tension are retained. The following observations of Clarus upon this subject appear to deserve attention. The view just presented explains why colchicum is a more certain remedy for gout than for rheumatism. In the former disease a large quantity of effete azotized matter is accumulated in the blood, the excretion of which must necessarily contribute to abate the fever and distress. In the latter there is no evident retention of a material poison in the blood; on the contrary, the cutaneous secretion is abundant, and the scanty urine results from the fever. In gout we may regard colchicum as a depletory and excretory agent, but in acute rheumatism as an antiphlogistic, and as tending to limit the formation of uric acid.

Various Diseases.—Several writers, among whom may be mentioned Lewins and Haden, speak highly of the efficacy of colchicum in "fever," but of what form, under what circumstances, and with what degree of success, does not appear. Mr. Tait conceived that he was very successful in treating scarlatina of an inflammatory type with colchicum. Subsequently, Mr. Bennett, in a case of this disease, marked by alternate delirium and coma, and scanty urine without any deposit, gave colchicum together with acetate of potash and spirit of nitric ether. The cerebral symptoms disappeared, and a large

Lancet, 1837–8, i. 198.

¹ Lond. Med. Gaz., vii. 584.

² Edinb. Med. and Surg. Jour. and Braithwaite's Retros., No. iv. p. 10.

Notes and Reflections (Am. ed.), p. 89.

⁴ On the Action of Medicines in the System, p. 319.

⁶ Handbuch der speziellen Arzneim., p. 579.

by Laycock.' It would appear in some cases to have afforded very great relief. This preparation has also been used to destroy vermin

infesting the head and pubis.

ADMINISTRATION.—The dose of the dried cormus is from two to eight grains, which may be repeated every two or three hours until its specific effects are obtained. By some persons it is considered the most efficient form of the medicine. Of the wine of the root, and of either fluid extract, the dose is stated at from ten minims to a fluidrachm; of the wine of the seeds, at from half a fluidrachm to two fluidrachms, and of the tincture about the same. The dose of acetic extract of colchicum is one or two grains.

Potassæ Bitartras, vid. Cathartics.
Sodæ Boras, "Irritants.
Spiritus Ætheris Nitrici, "Diaphoretics.
Liquor Ammoniæ Acetatis, ""
Dulcamara, "Narcotics.
Oleum Terebinthinæ, "Stimulants.

EMMENAGOGUES.

EMMENAGOGUES are medicines which promote the discharge of the menses. It is more convenient, however, to embrace under this title all medicines which are employed to influence the uterus, as well in the unimpregnated state as in pregnancy, and whether its functional activity be above or below the normal standard. Without such an extension of the meaning of the term, it may be doubted whether a true emmenagogue exists; and yet it is of the highest practical importance for the physician to be acquainted with the means which are at his disposal for restoring or regulating a function which is one of the most important, if not altogether the most so, in the female during the greater part of her life. It is the sign of her fitness for fulfilling the chief end of her earthly existence, the propagation of the human species, and its varying conditions, more than those of any other function, are the index and the measure of her health.

It was customary, until a very recent period, to consider all of the disorders which are usually associated with derangement of the menstrual function as its direct consequences, but later and more accurate observation has rendered it probable that in the greater number of cases the uterine disorder is secondary, an effect of general morbid causes involving the whole system, rather than itself a cause of constitutional disease. But this proposition must not receive too wide an extension, since nothing can be more certain than that a suppression of the menses sometimes induces a state of unequivocal and pro-

¹ Med. Gazette, xxiii. 899.

function, such as occasionally takes place in temperate climates, and is very frequent within the tropics, or when it results from an untimely stimulation of the genital organs by sexual intercourse or other excitants of these parts. But both scanty and excessive menstruation are frequently, and, it must be admitted, even more frequently, dependent upon causes remote from the uterus itself, but by the operation of which this organ suffers in common with the rest of the economy. Yet, even under such circumstances, whatever treatment may be employed, and however successful it may be in re-establishing the general health, that result is never complete and permanent unless the catamenial flow is at the same time restored to its normal condition. is most strikingly the case when it has been entirely suspended by causes which do not necessarily involve organic changes, such as cold, and mental impressions. But in proportion as a suspension of the discharge has resulted secondarily or indirectly from causes acting through the general system, will the return of the menses tend to coincide with that of a healthful condition of all the vital organs. Such is the case when the blood is impoverished by a waste of its elements, as by hemorrhage or depletion, by diarrhœa, hydruria, diabetes, or suppuration; or when it is impaired by a deficiency of food or a want of assimilative power, as in typhus and yellow fever, scurvy, or anæmia from starvation, scrofula, &c.; while in other diseases, such as phthisis, cancer, &c., affecting the whole organism, or exerting a local and mechanical injurious influence upon the uterine system, as cancerous and other tumors of the ovaries or uterus, the duration of the catamenial derangement must usually be permanent, for the cause of it cannot be eradicated.

In looking, then, at the several groups or categories into which cases of menstrual derangement may be divided, we may exclude those which are dependent upon incurable organic disease, or only regard them in so far as they involve one of the elements contained in the other groups. Thus, in advanced phthisis, which is incurable, the immediate cause of the amenorrhoea which so often accompanies the disease does not differ from that which produces it under the influence of loss of blood and numerous debilitating causes, and which is mainly denoted by a remarkable falling off in the proportion of the red corpuscles of the blood. All of the other groups may be arranged in two classes, one of which contains the emmenagogue agents which restrain, and the other those which produce, excitement. The former are adapted to all of the cases in which a congestive element prevents the due performance of the function, and the latter to those much more numerous instances of torpor, whether strictly local, or arising in connection with constitutional derangement.

Sedative emmenagogues are exclusively agents which tend to diminish the amount of blood in the pelvic viscera. They may consist of general or local depletion, sedative emetics, saline cathartics, and revulsives, including the general warm bath, the hip-bath, and the footbath. They are best adapted to the treatment of recent cases of arrest of the menses by cold, mental emotion, or some acute disease; but, even when the affection is chronic, are not to be neglected whenever a

ERGOTA. - ERGOT.

DESCRIPTION.—Ergot (seigle ergotisé, or spurred rye; Mutterkorn, or womb-grain) is a metamorphosis of rye, or other cereal, by which it is converted wholly or in part into a curved, purplish-black, cylindrical, tapering, and grooved excrescence, from one to three lines in diameter, and usually from six to ten lines long. When dry it is firm and brittle, but is flexible and tough when moist, and emits a sickening, heavy smell. Its color internally is white, with a slight tinge of pink. Its taste is nauseous, and somewhat acrid.

Ergot is produced by other cereals besides rye. Mialhe found that the ergot of wheat is identical with that of rye in the qualities of its proximate principles, and in its action upon the gravid uterus. His conclusions have been confirmed by Pourcher, and by Jobert.

The origin of this product is unknown. Some have conceived it to be formed by an insect, and others have regarded it as a fungus. It

is most apt to be produced during wet and warm seasons.

The natural history of ergot was very zealously investigated by Mr. Quekett, whose essay upon the subject the reader may consult with profit. Perhaps the most intelligible account of the subject is that of Debourges de Rollot. He states that the first change in the diseased grain is to become softened, and then friable, during which time it undergoes a species of fermentation, and exhales a nauseous smell. Afterwards its surface is found covered with fissures, and a whitish, viscid, and sweetish fluid exudes from them, which collects at the top of the grain, and glues together the anthers and stigmas. The fluid has an acid reaction. By this time the perisperm, except at the summit of the grain, is destroyed, and no traces of a germ can be detected. If the grain is powdered and mixed with water, the addition of iodine does not reveal the presence of starch. By degrees it turns from white to yellow, and afterwards to brown, beginning at its lower part, its bulk also increases, and its shape passes into that of ergot.

Ergot has several constituents, one of which is known as the alcoholic, and another as the watery extract, neither of which displays any very active properties in the usual and normal state of the system. It also contains a resinous matter which acts chiefly upon the stomach and bowels, and an oil upon which its poisonous properties seem to depend. It is said by Kluge, and by Green, to be more active when gathered from the standing grain at harvest time, than when collected after harvest. Arnal asserts that it is more active when old than when fresh. He affirms that it undergoes, by keeping, a fermentation which develops its virtues, provided it be not exposed to the air. But this statement is not in harmony with general experience. The hæmostatic virtues of the drug are referred by Bonjean to an extract

¹ Bull. de Thérap., xxxix. 41.

³ Am. Jour. of Med. Sci., Oct. 1856, p. 479.

⁴ Lond. Med. Gaz. (1836), xxiii. 600.

BECK, Obs. on Ergot, p. 6.

² Ibid., xlviii. 467.

⁵ Bull. de Thérap, xxiii. 310.

⁷ Bull. de l'Acad. de Méd., xiii. 680.

interdicted in France. But in 1777, Desgranges, an accomplished accoucheur of Lyons, extolled its efficacy, published many luminous reports of its activity and usefulness, and eventually succeeded in bringing it into general use. Nevertheless it did not find favor with physicians, and was well nigh forgotten by them for nearly half a century.

Meanwhile it came into notice under more favorable auspices in America. For this we are indebted to the late Dr. Stearns, of New York. In 1807 he sent from Waterford, N. Y., to a correspondent, a sample of what he called pulvis parturiers, describing it as a spurious growth of rye, and stating that he had for several years used it successfully to expedite lingering parturition when the pains had subsided, and were incompetent to expel the fætus. In this communication he dwelt upon the necessity of first ascertaining that there is no obstacle either in the position of the child, or the state of the maternal organs arising from an imperfect opening of the os tincæ, or rigidity of the other maternal parts. He found the decoction more active than the powder. This account was soon confirmed by Dr. Akerly, of New York, who also mentioned his having heard of its use by women in New York and Connecticut, for the purpose of procuring abortion. In 1813, Dr. Prescott called attention to the rapidity of its action, and stated that it began to operate within seven minutes after being taken. Now, for the first time, arose the suspicion, afterwards so generally entertained, that it endangered the life of the child by causing a too violent and unremitting compression of its body. The notice of its virtues by Chapman, and the more detailed account of its properties by Dewees in 1817-18, contributed still more largely to recommend and to diffuse its employment. In 1821, Dr. Atlee, of Philadelphia, reported his great success with it in threatened abortion, which the usual remedies could not prevent, and which excessive hemorrhage rendered alarming; in cases of hemorrhage near the end of gestation, connected with atony of the uterus, and in lingering labors without any physical obstacle to their completion. He also described its benefits in hemorphage after labor from imperfect contraction of the womb.

In France, although the American observations were known, they were generally discredited, because Chaussier and Madame La Chapelle pronounced the medicine inert, nor was this prejudice overcome until the cases presented by Bigeschi to a medical society of Paris in 1823, succeeded in attracting a closer attention to the subject. In England, too, authority was allowed to outweigh experience. Ergot was introduced into that country in 1824, but its acceptance was hindered by a letter from Dr. Hosack, of New York, to Prof. Hamilton, of Edinburgh, in which the former accused it of being pulvis ad mortem, rather than pulvis ad partum.' Even in 1825, Dr. Davis de-

WRIGHT, Edinb. Med. and Surg. Jour., Jan. 1840, p. 23.

² Med. Repository, ii. 308. ³ Ibid., xii. 341.

⁴ A Dissertation on the Natural History and Medicinal Effects, &c.

⁵ N. Eng. Jour. of Med. and Surg., ii. 353.

⁶ Am. Med. Recorder, iv. 141.

⁷ Hosack's Essays, ii. 296.

section to be pale and flabby, the heart was full of dark blood, the bronchial lining membrane and trachea were bathed in pus, the mucous membrane of the small intestine was injected. Tubercles were found in the lungs in some cases, and in some there were purulent collections in the joints.

In Tessier's experiments, ergot was mixed with the food of pigs.¹ They showed a reluctance to eat it. Its first effects were redness of the eyes and ears; the latter organs and the limbs then grew cold, the joints swelled, gangrene attacked the ears, limbs, and tail, and the animals died in convulsions. One of them, six months old, lived for sixty-six days. Its intestines are described as having been inflamed

and gangrenous.

Parola gave from half an ounce to two ounces daily to a mule. From the second day the pulse fell, the heart grew feeble, irregular, and jerking, the breathing slow and deep; the appetite and flesh failed; tremulousness, a staggering gait, and dulness succeeded. On the other hand, Block fed a number of sheep and cows for several months together upon fodder containing a large proportion of ergot. No mischief whatever ensued. Supposing the experiment to be correctly stated, we can only account for the result by supposing that

the ergot employed was quite inert.

The action of ergot upon birds is much more distinct and decided. Bonjean gave two drachms daily of powdered ergot to cocks and hens. About the seventh day they became dull, languid, without appetite, and were affected with diarrhoea. In some cases the comb grew cold, bluish, flaccid, and covered with ecchymoses; in others it was ulcerated. Black blood flowed from the nostrils, the animals were unable to walk, their breathing grew slower, and emaciation and death followed. In other cases the plumage was shed, and the beak and claws were surrounded by a bluish circle. The experiments of Tessier on ducks' furnished results almost identical with these; and in a turkey the symptoms were precisely like those just described. Gross, of Breslau, gave ergot, or else bread that contained either it or ergotin, to pigeons. At first they were disposed to vomit, but in the course of two or three days showed an increased appetite. This, however, was followed by dulness, restlessness, or immobility, convulsive twitches of the muscles, diminished action of the heart and lungs, and death between the fourth and seventh day. Similar effects were produced in fowls and small birds, such as linnets and sparrows, the former of which died within forty-eight hours after eating fifteen or twenty spurs of ergot.

Bonjean gave three drachms of the oil of ergot to a rabbit; it appeared distressed and feeble, and was afterwards convulsed, with opisthotonos. To birds it generally proved fatal, but first produced symptoms of narcotism. Six-drachm doses were not fatal to dogs, but occasioned in one case spasmodic symptoms, and in another only

CANSTATT'S Jahresbericht, 1845, p. 255.

⁵ Revue Méd., xliii. 138.

¹ Revue Méd., xliii. 140.
2 Annales de Thérap., ii. 89.

Wibmer, Wirkung, &c., v. 85.
 Traité Théorique et Pratique de l'Ergot de Seigle, Paris, 1845.

ergot injected into the veins of a cow caused the animal to calve

speedily.

The following statement of Youatt shows conclusively that ergot acts upon the uterus of animals in labor precisely as it does in the case of the human female: "I have for the last six or seven years been in the habit of administering the ergot of rye to quadrupeds in cases of difficult or protracted parturition. . . . In the monogastric, if · I may venture to use the term, I have never known it fail of producing considerable effect, even when the uterus has been previously exhausted by continued and violent efforts. In the ruminant, with its compound stomach or stomachs, I have witnessed many a case of its successful exhibition. . . The uterus has in every case responded; it has been roused to a greater or less degree of renewed action."

On Man.—In 1824 Lorinser and several companions took each of

them two drachms of powdered ergot upon bread and butter. The symptoms in all the cases were alike, and consisted of some colic, nausea, and vomiting, salivation, occasionally diarrhoea, and a sense of fulness in the head. Similar effects were obtained by Gross and an associate who each took a drachm of ergot. And such also are the symptoms ascribed to the medicine by Raige-Délorme. Trousseau and Maisonneuve, besides the above effects, particularly noticed dilatation of the pupils as the most constant phenomenon. It began within twelve or fourteen hours and continued for several days. sight was not affected. Headache and vertigo, sometimes so marked as to resemble intoxication, and followed by drowsiness, were also observed. Hussa describes similar symptoms as produced by bread containing a sixth or a fifth part of ergot. The headache generally continued for several days. Bonjean took a drachm of powdered ergot in three equal doses before breakfast, and found that the symptoms were precisely such as have been described. Other testimony to the same purpose might be adduced, but it is scarcely necessary, since the results here cited were so uniform. It should be mentioned, however, that writers may be found, including Parmentier, Lalesque, Uberti, &c., who assert that ergot has no effect upon the healthy system, except, perhaps, to render the pulse less frequent.

The power of ergot to lower the pulse is unquestionable. In some experiments upon himself, Parola found that his pulse fell from 74 to 60, and from 79 to 72,7 and Dr. Quinton Gibbon, of New Jersey, observed a decline of the pulse in himself from 70 to 57, and in another person from 64 to 55. In this case a repetition of the trial produced the same result. Arnal's numerous experiments showed that the action of a drachm of ergot commenced within an hour, and in the course of four hours lowered the pulse from 84 to 62. After allowing for the influence of natural causes, the time of day, rest, &c., it appeared that the pulse was still lowered, on an average, eight beats

¹ Prreira, Mat. Med. (3d Am. ed.), ii. 137.

² Edin. Med. and Surg. Jour., xxvi. 453.

Canstatt's Jahresbericht, 1845, p. 256.

⁴ Dict. de Mél., 2ème éd., xviii. 271. ⁵ Bull. de Thérap., iv. 106. • Ibid., liii. 285.

⁷ Annales de Thérap., ii. 91.

headache, and dilatation of the pupils, followed by colic and infrequency of the pulse.1

Among the effects of ergot may be noticed those which are occasioned by the use of food containing a large proportion of this substance, and which are included under the general name of ergotism. The records of this disease have been traced back to classical times, but they are more clearly to be recognized in the descriptions of epidemics of dry gangrene, one of which was recorded by Sigebert de Gremblour, in 1096.² In 1597, a spasmodic disease which was attributed to ergoted rye, prevailed in Hesse and the adjacent territories. Epidemics of the same sort occurred in 1648, 1675, 1702, and 1716, in Germany, as well as in Flanders, and in France. In Sologne, a French province where rye is much cultivated, this disease has repeatedly been prevalent. Two forms of the affection have been de-

scribed, the spasmodic and the gangrenous.3

Spasmodic ergotism begins with malaise, formication of the whole skin, cramps and numbness of the extremities, and pains in the head and back. This state lasts from one to three weeks, and ushers in heartburn, epigastric oppression, vertigo, syncope, deafness, paroxysmal or permanent flexure of the joints, or equally violent extension and opisthotonos, twitching of the facial muscles, in some cases violent delirium, with cold skin, intense internal heat, and fetid sweats. attacks are sometimes preceded by digestive disturbance, and last from half an hour to two hours or more. After a time the convulsions cease. They are followed by exhaustion, debility, oppression, heartburn, and a ravenous appetite, which it is dangerous to gratify. Sometimes strabismus or loss of sight succeeds,4 with an eruption of bullæ upon the skin, or general insensibility. After death in fatal cases, the stomach and bowels are found inflamed, and the parenchymatous organs congested. The attack usually lasts for three or four weeks, and is very fatal. In 1735, during an epidemic in Wurtemberg, out of five hundred persons attacked, three hundred under fifteen years of age perished.

The gangrenous form of ergotism is quite different from the foregoing. The first symptom is a dull pain and weariness of the limbs, with a heavy and stupid expression of countenance. The skin has an earthy or jaundiced hue. The extremity or the nose about to become affected grows quite cold, and the skin over it is of a dusky red color. The gangrenous process generally begins in the central parts of the limb, and afterwards attacks the skin, extending upwards towards the trunk from the fingers and toes, causing these parts to blacken, shrivel, and harden, until they resemble the flesh of a mummy. Sometimes, however, they present the appearance of ordinary gan-

¹ Reil's Mat. Med. d. rein. chem. Pflanzenstoffe, p. 166.

² Goupil, Jour. des Progrès, iii. 161.

³ Ozanam, Maladies Epidem., iv. 226; Bergen and Muller, Haller's Disputations, i. 78; Duvivier de Saint Hubert, Traité Philosophique des Maladies épidemiques, &c., Paris, 1836; Heusinger, Studien über den Ergotismus, Abstract in Jour. f. Pharmakodyn., i. 404.

^{*} Meier, of Kronstadt, has shown that cataract is a very usual consequence of chronic ergotism. See Archives Gén. de Méd., Mars, 1863, p. 350.

fermentation in making bread and the action of heat in baking it diminish greatly the activity of any ergot it may contain. Hence, he

says, the crust of such bread is less injurious than the crumb.

In Labor.—Dr. Stearns, soon after his introduction of ergot into medical practice, so far from advocating its habitual employment, stated expressly that he had not found it necessary in more than one out of thirty cases. The indications for its use, as given by him, are the following: To use it, 1. In lingering labors when the child is low, the parts relaxed, the pains absent or feeble, and there is danger of delay from hemorrhage or other alarming symptom. 2. When the pains are suspended and convulsions set in, premising venesection. 3. In inevitable abortion. 4. When the placenta is retained by uterine inertia. 5. In post-partum hemorrhage under like circumstances. Subsequent experience has confirmed the soundness of these rules, and has not made any essential addition to them. Obstetricians have clothed them in every form of language, but without altering their spirit. The only question which may admit of different solutions is, at what period of the passage of the child through the pelvis is the administration of ergot advisable? The more prudent and skilful tend to restrict its use. Thus, Dr. Meigs says that he scarcely gives ergot as an expulsive agent. He chiefly employs it at the moment of, or just before, the birth of the child, in order to secure a good contraction of the womb in women who are known to be subject to hemorrhage. To administer it merely for the purpose of hastening natural labor and abridging the attendant's weariness of waiting is wholly inexcusable, and argues a culpable ignorance of the powers of the drug. We shall consider in succession its action upon the mother and upon the child.

Several writers have called attention to a painful, spasmodic, and, as it were, tetanic contraction of the gravid uterus provoked by ergot, which, so far from indicating an expulsive effort on the part of the organ, shows directly the reverse. To this action, it may here be stated, a share of the disastrous influences of ergot on the child is fairly to be attributed. Dr. Hardy has drawn attention to the fact that, when ergot is used, the volume of the uterus is often found much greater than after ordinary labors, imparting to the hand almost the feel of a uterus before the expulsion of the placenta. It is at the same time hard, and remains so for several days. It is sometimes stated that ergot may occasion rupture of the uterus. Several cases of the sort are reported. One is upon hearsay evidence, and occurred in the hands of a medical student. Another was under the

The fullest account of epidemic ergotism will be found in the paper of Mr. Wright, in the Edinb. Med. and Surg. Jour., lii. 207; and besides this and the papers referred to above, the reader will find an interesting abstract of its history by Lasegue in Archives Gén., Mai, 1857, p. 594. A brief notice of an epidemic at Lyons in 1854 is given in the same journal, Nov. 1855, p. 605; and "A Supposed Case of Ergotism," with interesting historical details, is published by Mr. Camps in Brit. and For. Med.-Chir. Rev., Jan. 1855, p. 196.

<sup>Dublin Quart. Jour., xxvii. 230.
Armstrong, Lond. Med. Gaz., July, 1838, p. 734.</sup>

just given.' In addition to these effects, it may be mentioned that certain of the peculiar poisonous actions of the oil of ergot are sometimes manifested in the mother during labor, such as delirium and headache, dulness, incomplete coma, lividity of the countenance, mus-

cular rigidity, &c.2

The influence of ergot upon the child is by far the most important question that relates to this medicine. At the commencement of its use we had the high authority of Dewees for believing that there was no decisive instance of its having a direct and unfriendly influence on the child. The cases to the contrary he held to be those in which it was given too early, when the soft parts were unrelaxed, or the head was not well situated. The same opinion was expressed strongly by Chapman. But as early as 1822, we find Dr. Moore, of New York, stating that "it appears to be injurious to the child at all times, for in every case in which I have seen it exhibited, the child has been stillborn, and in the greater part of them it was not possible to restore it to life." In 1828, Dr. R. M. Huston maintained that, even when given under all the favorable conditions admitted to be necessary, the medicine is still chargeable with the death of many children, and he refers to the experience of Church, Holcombe, Hall, and others, for a confirmation of this statement. In 1834, Dr. Hooker, of New Haven, used the oil of ergot in six cases of labor, which illustrate the peculiar operation of this constituent of the drug. In three of them twenty, thirty, and forty drops were given without effect. In the fourth case fifty drops were administered, and the woman complained of a strange sensation in the head. In the fifth case sixty-five drops, and in the sixth case seventy-five drops were used. In both the labors were easy, but "the children for a considerable time after birth had a livid appearance, and respired with much difficulty and irregularity, with the ordinary appearance of ergotism." In no case was there any increase of the uterine contraction. More recently Drs. McClintock and Hardy have said, "It by no means follows as a consequence that the ergot will not act upon the child, because it does not act upon the uterus, for we have seen numerous instances where the child was unquestionably affected by it, although the uterus was wholly unaffected, or nearly so." Signs of congestion in the fœtus were observed to arise from ergot by Lorenz, who ascribed them to the dose being too large, viz., fifteen to twenty grains. Dr. Catlett maintained that it tends to produce hydrocephalus in the early stage of infantile life.9

All of the statistics, embracing many cases of labor in which ergot was employed, show a large proportion of stillbirths. Prof. Busch, of Berlin, administered it in 175 cases, on account of weak labor-pains, after the os uteri was well dilated. 177 children were born, of whom

¹ N. Y. Jour. of Med., Nov. 1853, p. 324.

^{*} MAUNSELL, Lond. Med. Gaz., xiv. 605. TRASTOUR, Brit. and For. Med.-Chir. Rev., Oct. 1857, p. 523..

^{*} Therapeutics, i. 340.

* Hosack's Essays, ii. 296.

* N. Amer. and Surg. Jour., vii. 81. See, also, Beck, Obs. on Ergot, p. 8.

⁶ Boston Med. and Surg. Jour., x. 298. ⁷ Loc. inf. cit.

BIBRBACH, Neueste Entdeck, i. 135.

⁹ Edinb Month. Journ., Feb. 1842, p. 210.

17 were dead, and 18 in a state of asphyxia. Again, Mr. Chatto refers to 420 cases of labor, in 80 of which ergot was exhibited. children were born, of whom 31 were dead. 10 stillbirths occurred among the 80 cases treated by ergot, and 21 among the remaining 340 So that the proportion of deaths in the former class was one in eight, but in the latter only one in seventeen. In the Report of Drs. McClintock and Hardy we find that out of 259 tedious and difficult labors, 173 deliveries took place without any instrumental assistance. "Of this number thirty got ergot to overcome inertia in the second stage of labor, and only ten out of the thirty children were born alive." In other words, the proportion of deaths attributed to this agent was one in one and a half. Dr. R. U. West, in defence of ergot, has published an abstract of sixty-nine cases of labor in which it was administered. Nine children were stillborn, or rather more than one in eight, a proportion regarded by Mr. Chatto as condemnatory of the use of this drug. These statistics leave no doubt of the fact that ergot administered before the close of labor has proved very destructive to the life of the child.

Is this danger inherent, or does it depend upon the conditions under which the medicine is employed? In seeking to find an answer to this question it may be stated, first, that a different result from those just quoted has sometimes been obtained. Thus M. Godquin, comparing the success of ergot with that of the forceps, concluded it to be less injurious to the child. He draws this inference from an analysis of 1,885 labors, of which 780 took place after he began to employ ergot. Previously, he had found it necessary to apply the forceps in 1 out of every 25 cases, and lost 1 child in 88; while subsequently he was obliged to use the forceps but once in 65 cases, and lost but 1 child in 260.' It may be said that the timely intervention of the forceps prevented the mischievous effects of the ergot; and this we suspect to be a just commentary upon the facts; for the state of the fœtal heart under the action of the drug proves clearly that the duration of this action is the chief source of danger to the child. As Dr. Beatty remarked, if it be short, the child will be born alive, but if it be delayed two hours, the child will be stillborn. The danger from delay is manifold.

In a subsequent publication to that mentioned above, Dr. West admitted that his original conclusions were not drawn from a sufficiently large number of cases to establish a law, but claimed that his more recent, added to his earlier experience, presented a more favorable result. Thus in 241 ergot cases there were but 14 stillbirths from all causes, or nearly one in seventeen. Dr. John W. Beck, of Ulster (Id.), states that in 296 cases in which he administered ergot, the child was born dead twenty times, or died very soon after birth, a proportion of about one death in fifteen cases, or almost the

Neue Zeitschrift für Geburtskunde, Bd. xv., and Lond. Med. Gaz., xxiv. 337.
 Lond. Med. Gaz., xxiv. 575.
 Dub. Quart. Jour., Feb. 1851, p. 36.

⁴ Times and Gaz., Dec. 1855, p. 617.

⁶ Bull. de Thérap., iv. 127. ⁸ Dublin Quarterly Journal, xxv. 204.

⁷ Times and Gaz., July, 1861, p. 72. ⁸ Am Jour. of Med. Sci., Apr. 1864, p. 541. VOL. II.—38

same as that reported by Dr. West. In this country a distinguished practitioner and teacher of obstetrics, Dr. Storer, has declared that "he never knew deleterious effects to be produced by ergot, when its administration was clearly indicated.\(^1\) These numerical results of observation, and this conclusion derived from a long and enlightened experience, are too important not to be allowed their full weight; but as, when they were originally announced, they met with an emphatic dissent from obstetricians of the highest character and ability, we cannot now accept them as representing the actual danger to which ergot exposes the life of the child during labor, so long as they are opposed by the opposite results derived from equally authoritative and more numerous sources.

Dr. Beatty is of opinion that ergot is capable of directly exciting fatal muscular spasms. He also reports six cases of which the distinguishing characters were general lividity of the surface, universal rigidity of the muscular system, producing stiffened limbs and clenched hands in those infants in whom life was extinguished, and a remarkable kind of alternating spasm and palsy in those that were resuscitated. It is true that Dr. Denham doubts the dependence of these symptoms upon ergot, remarking that children are sometimes born in a cold, livid state, and more or less convulsed, when no ergot has been administered to the mother. But, it may be rejoined, these symptoms were shown by Dr. Hooker to follow the use of oil of ergot, which has no influence on the contractile action of the womb. But, apart from this fact, the direct action of ergot upon the fœtal heart is no longer questionable. Dr. Hardy found that it diminished the frequency of the heart's pulsations, and sometimes produced irregularity and even intermittence of them. He observed, indeed, that when the number of the pulsations had been steadily reduced below 110, and were at the same time intermittent, the child was rarely saved. He was careful to note that this effect was sometimes quite independent of the compressive action of the uterus.2

The changes produced by ergot in the circulation within the uterus have been carefully examined by M. Dépaul. He has shown that during the contractions of this organ in natural labor, its peculiar murmur becomes altered in tone, and fainter, and sometimes even ceases to be heard. At the same time the fœtal pulsations grow hurried and feebler until the end of the pain, when both sounds resume their proper characters. The intermittent action of the uterus appears to be intended to prevent the dangers of a suspended circulation in the uterine vessels, and it is only towards the close of labor when the head and chest of the child have been in a great measure released from the grasp of the uterus that the pains become more continuous and steady. But ergot excites tonic and continued contraction, so that the child's head and trunk are subjected to the unrelaxing pressure of the womb. No truce is allowed to repair exhaustion and permit fresh blood to fill the uterine and fœtal vessels. It cannot be

Boston Med. and Surg. Jour., August, 1862, p. 18.

² Dublin Quarterly Journal, xxvii. 224. Abeille Médicale, Avril

nipulation, or of some other external influence, that ergot of itself can excite uterine contractions during the first half of pregnancy." Such, also, is probably the opinion of physicians who have had the best opportunities of studying the subject. It is, however, to be recollected that the distension of the uterus at this period is a normal condition, and it does not follow that an equal or even a less degree of enlargement should not have a different result when it depends upon morbid causes. This is the case in menorrhagia. It was so in a singular accident reported by Dr. J. E. Taylor, of New York. female who was not pregnant, had some leeches applied to the neck of the uterus to relieve engorgement of that organ. One of them found its way into the cavity of the uterus, where it occasioned bearing-down pain and a bloody discharge. Ergot was administered, and a clot expelled holding in its centre a dead leech. There is reason to think that, under certain circumstances, ergot may even prevent the progress of abortion when it depends upon a relaxed or debilitated state of the uterus, if the medicine is given in small doses. This may be inferred from several cases reported by Dr. Gardner, of New York. The patients, in an early stage of pregnancy, had been strained by lifting weights, or had received a blow upon the back. Blood was discharged per vaginam, and the os uteri was dilated, but there were no decided labor-pains. Small doses of ergot were administered, which appear to have arrested the hemorrhage and prevented miscarriage.² Still more to the point is a case reported by Mr. Ker, of a woman who had for several years suffered from prolapsus of the uterus with leucorrhœa. The prolapsus at length became complete and irreducible. Under the idea that the enlargement was of an asthenic nature, and might be relieved by stimulants, ergot was administered. The tumor then contracted sufficiently to admit of its reduction.8

Uterine Hemorrhage.—Ergot was early employed to check hemorrhage during or subsequent to labor. In the Historia Plantarum (1688) Ray speaks of the remarkable power of ergot to restrain the lochia, "singulare præsidium ad compescendum lochiorum fluxum." It was prescribed for this purpose in Philadelphia in 1821, by Eberle and Dr. Shallcross, and soon afterwards by Goupil in France, after which it came into general use. Its most obvious advantages are obtained when the uterus remains distended with coagula after delivery. In unavoidable hemorrhage from placenta prævia, Dr. Ramsbotham says that, when the uterus is flaccid, and the female exhausted, before the operation of turning is resorted to, diffusible stimuli should be given, and a dose or two of ergot. A similar practice had been advised by Dr. Ward, of New Jersey, but Dr. Dewees condemned the practice strongly, unless the os uteri were dilated or easily dilatable,⁶ as did also Dr. Jackson (of Northumberland), upon the ground that the state of the parts cannot be determined with accuracy.7

¹ New York Jour. of Med., Sept. 1858, p. 219.

Ibid., p. 226.

⁴ Am. Med. Recorder, iv. 218.

[•] Am. Jour. of Med. Sci., i. 260.

Lond. Med. Gaz., xiv. 604.

⁵ Lond. Med. Gaz., xiv. 660.

⁷ Ibid., ii. 89; and iii. 362.

and other quadrupeds by which they professed to demonstrate the hæmostatic properties of this preparation, are quite inconclusive; for, as Velpeau pointed out, and as the Philadelphia committee on the so-called Brocchieri water demonstrated, the natural plasticity of the blood in these animals is so great that wounds even of large arteries seldom destroy them. To a great extent, also, hemorrhage in man will cease under the combined effects of rest and slight compression when arterial trunks are wounded, so that there is no longer any doubt that, so far as hemorrhage of this sort is concerned, ergot and its preparations are useless.

Leucorrhæa, probably of the uterine form, was successfully treated with ergot by Marshall Hall in the example already alluded to. Eight very interesting cases of the affection were cured by Bazzoni, and seven by Negri; Fife also cured by its means several distressing cases where the strongest astringent injections had been employed without any effect, or with that of exciting inflammatory action.

In amenorrhæa ergot is said by Ackerly to have been used successfully by Dr. Beckman, of New York, in 1809; and some other cases are quoted by Neal, Wright, and Davies. According to Dieu it has succeeded with many physicians in restoring the flow of the menses in young girls after their suppression for several months, and when ferruginous preparations had failed of their effect; and Neligan states that in several cases of chlorotic amenorrhæa he employed the infusion with the most beneficial results.

"Engorgement of the Uterus."—Arnal has published a number of cases of this affection as having been cured by ergot.

Uterine Hytatids.—Dr. Dewees first proposed the use of ergot to procure the expulsion of hydatids when the uterus will not readily admit the hand, or when its contractions are too feeble or are insufficient to produce their extrusion. This method was employed successfully by Dr. Macgill, of Hagerstown, Md. The uterus threw off a mass of hydatids as large as a child's head at birth, and the woman recovered without accident.

Uterine Tumors.—Dr. Dewees suggested that ergot might be useful in cases of polypi, to force them beyond the neck of the uterus for the purpose of applying a ligature, or with a view to their excision; and Dr. Davies appears to have been the first (1825) to carry out this recommendation. This treatment possesses the advantage of controlling the uterine hemorrhage even before it provokes the expulsion of the tumor. In 1828 Dr. McFarlane had a successful case, and in 1841 Dr. Somerville, of Edinburgh, a similar one. Two very interesting instances of its success were published by Mr. Moyle, one by Dr. Parr, of Newcastle-upon-Tyne, and another by Duclos. 12

- ¹ Archives Gén., xxvii. 410.

 ² Lond. Med. Gaz., xiii. 369.

 ³ Edin. Month. Jour., Feb. 1842, p. 209.

 ⁴ Med. Repository, xii. 346.
- Matière Méd., ii. 714.
- Medicines, their uses, &c., 4th ed., p. 215.
- Diseases of Females, 3d ed., p. 302. System of Midwifery, 6th ed., p. 630.
- Month. Jour. of Med. Sci., Aug. 1841, p. 570.

 10 Ibid., June, 1841, p. 416.

 11 Ibid., Feb. 1842, p. 208.
- Bull. de Thérap., lxv. 211, where several other cases of its successful use are referred to.

which is owing to apoplectic disease. Still more is it competent to cure those cases of vesical paralysis which are accompanied with a more or less general paralysis of the muscles of the extremities, but which are independent of organic lesions of the nervous centres.1 Millet also claimed that no medicine is so powerful as ergot in curing nocturnal incontinence of urine, particularly when it is associated with iron. The dose of the medicine which he found efficient was also very small. The formula he employed was the following: B.—Finely powdered iron filings gr.v, powdered ergot gr. iss. Make a sugar-coated Of such pills from five to ten were given morning and evening.2 Pétrequin found it successful in paraplegia when other means had failed, and he observed that, like strychnia, it produced prickling and formication of the palsied limbs. He gave doses of six or eight grains, and gradually increased them until forty grains a day were taken. Payan was equally successful; one of his cases was of senile paralysis, and two others, the result of concussion of the spinal marrow.4 Girard, of Marseilles, has also published three cases of paraplegia, the credit of whose cure is plainly attributable to ergot, and Saucerotte three others of the same character.

We have elsewhere (Vol. I., p. 736) directed attention to the grounds upon which Dr. Brown-Séquard explains the curative power of ergot in certain cases of spinal paralysis. This eminent physiologist has shown that by its power of causing contraction in the unstriped muscular fibres of the arteries, it limits the afflux of blood to the parts upon which the medicine specifically acts, and in the present case diminishes the amount of blood in the spinal cord and its membranes. It is, therefore, in paralysis depending upon chronic myelitis that the greatest efficacy of ergot should be displayed. And, in fact, it is so in a large proportion of cases. Several of those referred to above were occasioned by exposure to cold or by traumatic causes, such as blows or falls, which might readily give rise to hyperæmia of the spinal marrow and its membranes. Many of the other cases took place in connection with disease of the bladder, hysteria, or general exhaustion. In these the spinal paralysis was probably reflex in its origin, and maintained by the prolonged vesical, uterine, or other local irritation. Even without the removal of the primary cause, it is easy to understand that an agent capable of reducing the morbid congestion of the spinal marrow would also at the same time abate the paralysis.

Hooping-Cough.—In 1856, during an epidemic of hooping-cough, Dr. Grippenkerl observed that those patients who became affected with the ergotism then prevalent were cured of the first named disease. This led him to employ ergot medicinally, when he found that it appeared to act as a cure. Later, in 1861, during an epidemic of hooping-cough, he administered the medicine in more than two hundred cases with very decided success. He usually prescribed it in

¹ Bull. de Thérap., lix. 204.

³ Am. Jour. of Med. Sci., xxv. 205.

⁵ Ibid., xli. 199.

² Ibid., lxiii. 337.

⁴ Bull. de Thérap., xvi. 339.

Ibid., xlv. 503; 1. 32.

decoction, so that the virtues of twenty or thirty grains should be given in the course of a day to a child from five to seven years old. He also recommended that the treatment should not be commenced until the third week of the disease and in the absence of all complications.¹

Impaired vision, arising from an imperfect accommodation power of the eye produced by excessive fatigue of the organ in examining minute objects, has been advantageously treated with ergot by Willebrand, who prescribed it on the hypothesis that this disorder of vision was due to congestion, and that a medicine capable of exciting the contraction of the unstriped fibres of the bloodvessels must necessarily be advantageous. He is of the opinion that ergot is useful, and, in the same manner, in curing exophthalmos, goitre, chronic inflammation of the eye; in galactorrhœa, congestions and indurations of the uterus and of the spleen, &c. We are not acquainted with any confirmation of these conclusions.

Administration.—To produce contraction of the distended uterus, the infusion of ergot is a convenient preparation. One hundred and twenty grains of ergot may be infused for one hour in nine fluidounces of hot water, and the liquid given in wineglassful doses. Such, at least, is the usual rule, but it is preferable to administer tablespoonful doses of the infusion at intervals of five or ten minutes. It should rarely be given during labor, unless the child is near the os externum. The dose of the powder is from ten to twenty grains, repeated every fifteen minutes. To control menorrhagia, smaller doses, such as ten grains every hour, at first, and then at longer intervals, will suffice. The wine of ergot is seldom employed; the dose is from one to three fluidrachms. Of Bonjean's ergotin from one grain and a half to three grains every quarter of an hour during labor, or from five to ten grains as a hæmostatic.

GOSSYPIUM.—COTTON.

GOSSYPII RADIX .- COTTON ROOT.

DESCRIPTION.—Cotton is a filamentous substance separated from the seed of Gossypium herbaceum and other species of Gossypium. The cotton plant is a shrub three or four feet high, with a round, upright, pubescent stem, brown below and spotted above. The branches are spreading, with five-lobed leaves, and bearing a cup-shaped paleyellow flower, consisting of five petals united at their base. The capsule is three-celled, containing about three seeds in each cell surrounded by the cotton to which they are attached. The root is annual, tapering, and woody, with numerous fibres. It has neither taste nor smell.

HISTORY.—The cotton plant is a native of Asia, where

¹ Edinb. Jour., ix. 561.

² Brit. and For. Med.-Chir. Rev., July,

cultivated from the most ancient times for the manufacture of cloth. It was also in common use in America at the time of the Spanish conquest. Rumphius holds that it was worn by the patriarch Joseph, and was used in the drapery of the tabernacle. The hangings of Ahasuerus' palace were of dyed cotton. In the time of Herodotus, the Asiatics wore cotton garments; it was not until much later that the Egyptians and afterwards the Arabians cultivated the plant for the sake of its wool. It was first introduced into the United States in 1786. The word cotton is derived through the Arabian, Hebrew,

and Chaldee languages.

Uses.—The Tamool doctors are in the habit of prescribing a decoction of the root of the cotton plant in cases of strangury and gravel from a notion that it is demulcent (Ainslie). In the cotton regions in the southern States, it is much employed to act upon the uterine system. Professional attention was first drawn to this circumstance by Dr. Bouchelle, of Columbus, Mississippi, who claimed for it identical properties with ergot, or, rather, superior ones, for he stated that it originates, as well as intensifies, uterine contractions. According to this authority, it is habitually resorted to by the slaves for the purpose of producing abortion. He was of opinion, also, that it occasions sterility. Dr. B. used a decoction made by boiling four ounces of the inner bark of the root in a quart of water until it was reduced to a pint. Dose, a wineglassful every twenty or thirty minutes as an oxytocic. These statements were corroborated by the testimony of Dr. Shaw, of Tennessee, who also claimed for the decoction just described very striking virtues in dysmenorrhœa and scanty menstruation, and particularly in suppression of the menses by cold. A similar estimate of its virtues is furnished by Dr. Ready, of S. Carolina. The subject deserves further investigation.

Ainslie states that in Jamaica an emulsion of the seeds is given in dysentery, and is also supposed to be pectoral. Dutch physicians have recommended them as galactagogue, when given in decoction, or mixed with coffee, and stated that they have long been used in India for this purpose. Cotton seed tea has also been reputed to possess antiperiodic virtues; but the inherent improbability of such a virtue residing in a mucilaginous substance is not removed by any adequate testimony. The expressed oil, which is very bland, may be applied

to all the medicinal purposes of almond oil.

When, or by whom, cotton was first used as a surgical dressing does not appear. Probably, because naturally, it would be so employed wherever it was cultivated. The first printed notice of it that we are acquainted with, stated that it had been for a long time a popular remedy for burns. Dr. Anderson, of Glasgow, first employed it by wrapping the injured part in cotton wool, after bathing it either

7 Glasgow Med. Jour., May, 1828.

¹ Esther, i. 6, where the word Karpasi, Sanscrit for cotton, is translated blue.

Am. Jour. of Med. Sci., Jan. 1841, p. 275.
Charleston Med. Jour., xi. 118.
Trans. Amer. Med. Assoc., ii. 722.

<sup>RICHTER, Ausf. Arzn., i. 148.
Charleston Med. Jour., v. 416; Ibid., ix. 97.</sup>

with oil of turpentine, or lime-water liniment. This dressing was variously appreciated by different physicians, at the time, and continues to be so. The general impression appears to be that the method is best adapted to superficial burns. For these it is comparatively the most soothing and the speediest cure. But even when the tissue of the skin is interested, the dressing is still an excellent one, provided that it be rightly applied. Cotton "laps," in that case, should never be used, unless first carded into very thin laminæ. Glazed cotton is preferable, separated by the middle and applied by its woolly surface to the skin. Several layers of the same may then be superposed. At the first dressing, the layer in contact with the skin should, if possible, be permitted to remain. If the discharge is copious, dressings of a different kind are to be preferred.

Raw cotton is an excellent dressing for blisters, excoriations, erysipelas, eczema, and other superficial inflammations. It is far inferior to linen, or even cotton lint, as a hæmostatic, and as a dressing for wounds, on account of the difficulty with which it absorbs moisture in the first instance, and its want of firmness when once it has been wetted.

Rubia Tinctorum.—MADDER.

Of non-officinal substances which have been reputed to exert a peculiarly powerful action in restoring suppressed menses, this one is deserving of mention. Tournefort said of it that "it strongly provokes the courses." Francis Home pronounced it, after repeated trials, to be the strongest and safest emmenagogue with which he was acquainted, and he reports nineteen cases of amenorrhæa, of which fourteen were cured by its use. Its sensible effects were scarcely evident. It was administered by him at first in doses of half a drachm of the powder four times a day, and the quantity was gradually increased to a drachm at each dose. Other writers have also attested its efficacy, among whom may be mentioned Osiander, G. A. Richter, and Jahn.

```
vid. Irritants.
SABINA,
JUNIPERUS VIRGINIANA.
                                do.
CANTHARIS,
                                do.
                                do.
SODÆ BORAS,
                             Specific Tonics.
FERRUM,
MILLEFOLIUM,
                             Stimulant Tonics.
RUTA,
                          "
                                      do.
TANACETUM,
                             Anthelmintics.
                             Diaphoretics.
GUAIACUM,
                          "
                             Cathartics.
ALOES,
HELLEBORUS NIGER,
                          "
                                 do.
```

¹ CAZENAVE, Bull. de Thér., i. 230; TROUSSEAU, ibid., p. 247; Revue Méd., 1835; PAYAN, ibid., 1845.

² Clinical Experiments, p. 422.

ANTHELMINTICS.

ANTHELMINTICS are medicines capable of destroying or expelling worms which inhabit the intestinal canal. They have little, if any, effect upon oxyures vermiculares, which excite symptoms in the rectum alone, but they are chiefly used for the removal of tæniæ and ascarides lumbricoides.

Worm remedies may be thus divided, according to their mode of action:—

1. Those which are merely irritant, to which class belong all drastic, and especially resinous, cathartics, cowhage, and tin. These substances, by their violent action upon the bowel, increase its peristaltic movements, and thus tend to force the parasite to let go its hold upon the intestine; or they disperse the dense mucus in which it lies imbedded, and expel it from the bowels. Cowhage and powdered tin, administered to dogs, which afterwards were killed, had evidently produced a powerful irritation of the intestinal mucous membrane, and even points of bloody extravasation were found upon it. (Kuchenmeister.)

2. Medicines which exert an irritant action upon the stomach and bowels, occasioning more or less vomiting, diarrhoea, and colic. These are male fern, kousso, kameela, and saoria, the three first of them

being among the most certain remedies for tapeworm.

3. Medicines which, besides producing more or less derangement of the stomach, act upon the nervous centres. These include American and European wormseed, pomegranate, wormwood, pinkroot, azedarach, and oil of turpentine. The nervous symptoms produced by them are numerous, but, in some instances, consist only of headache, giddiness, confusion of ideas, and weakness of the limbs, and in others of disorders of vision, strabismus, dilatation of the pupils, drowsiness, stertor, spasms, or convulsions.

4. There is only one anthelmintic medicine which is efficient in the treatment of tapeworm, and which, at the same time, gives rise neither to vomiting, purging, colic, or nervous symptoms. This is pumpkin-

seed.

The efficacy of vermifuges bears no relation whatever to their sensible properties. Tænia is the most difficult to remove of intestinal worms, and it might be expected that the most powerful agents of the present class, those of which the action upon the economy is most decided, would be the most efficient in destroying it; but such is not the case. For if oil of turpentine and pomegranate, which occasion marked disturbance of the nervous system, are successful as tænifuges, kameela, kousso, and male fern, which produce no such effects, but act only on the alimentary canal, are quite equal to them in efficacy; and pumpkin-seeds, which give rise to no sensible phenomena at all, are scarcely inferior to either. On the other hand,

santonicum and its preparations, chenopodium, wormwood, spigelia, and calomel, which are the most successful remedies for the round

worm, have little or no effect upon the tapeworm.

In regard to the comparative value of the different tænicide medicines there is not a very great unanimity of opinion, although the weight of evidence is in favor of the oil of male fern. Dr. Peacock gives the preference to it above all other remedies, and ranks kameela next to it in virtue.' According to Dr. Ramskill, the alcoholic preparations of kameela are more uniformly effective than oil of male fern or than spirit of turpentine, and infinitely less disagreeable than either. Mr. Leared would set down the relative merits of the remedies as follows: Kameela is decidedly superior to kousso, which is a less certain vermicide, and is productive of great disturbance of the stomach, and other unpleasant effects. But he does not positively decide on the superiority of the former medicine to pomegranate bark, spirit of turpentine, and the extract of male fern.3 Mr. Adams. on the other hand, concludes that kameela is not superior to any of these remedies; and Kuchenmeister, supported by a large and wellweighed experience, concludes that male fern, and especially its ethereal extract, is most efficient for the expulsion of bothriocephali, and the latter preparation, with the aqueous extract of pomegranate bark, is the most certain cure for Tænia solium.

It is probable that all medicines of the anthelmintic class may be considered as either vermifuge or vermicide, or both at once. mere vermifuges, drastic purgatives hold the first rank; they tend to expel the parasites without necessarily destroying them, and hence they are of comparatively little efficacy in the treatment of tænia, whose hold upon the bowel, at least by its essential organ, the head, is much more firm than that of other intestinal parasites. Tin and cowhage, possess an analogous action, but are more potent in destroying the bodies of the worms, and are also more successful than drastics, especially in the treatment of tænia, which are more delicately constituted, and, therefore, more susceptible of mechanical injury. All other anthelmintics are probably in a greater or less degree vermicide and their relative efficacy can be determined only by experience. best ascertained elements for solving this still unsettled question have been set forth in the preceding paragraphs. It is often of capital importance, however, that the two kinds of worm medicine should be conjoined in the treatment; and that, after a vermicide agent has been duly administered, the weakened or dead worms should be acted upon by a drastic or other purgative medicine, in order to expel them from the bowel.

¹ Times and Gaz., Nov. 1858, p. 472.
² Lancet, May, 1858, p. 476.

<sup>Times and Gaz., Jan. 1859, p. 57.
Ibid., p. 59.
On Animal and Vegetable Parasites of the Human Body (Syd. Soc. ed.), i. 176.</sup>

MUCUNA.—COWHAGE.

DESCRIPTION.—"The bristles of the pods of Mucuna pruriens." These bristles, set or spiculæ, form a hairy down upon the pods. They are delicate, sharp, stiff, brittle, and shining. The plant is a native of the West Indies, but a very similar one called Mucuna prurita, is obtained from the East Indies. The former is a perennial climbing plant, bearing clusters of red or purplish flowers, which are succeeded by a coriaceous pod shaped like an f, and studded all over with bristly hairs which the touch readily removes.

HISTORY.—The anthelmintic virtues of cowhage were first made known in Europe by Chamberlain, in 1784. Browne, in his Natural History of Jamaica, states that a syrup prepared with it is used in that island as an anthelmintic, and Bancroft says that it is employed by the negroes of Guiana for the same purpose. In the East Indies its employment as a vermifuge was introduced by the English practitioners, but the Tamool doctors had long ago prescribed an infusion of the root of the plant sweetened with honey, as a remedy for

cholera morbus.1

ACTION.—When applied to the skin, the spiculæ adhere and cause a prickling and intolerable itching which lasts for a considerable time. Dr. Bigelow states,² that when thus applied and retained in place by means of lint and adhesive plaster, they excite redness on the second day, and afterwards papules, which increase in size for a week, and terminate in pustules and scabs. But when thoroughly moistened before being applied, the irritation is very slight indeed. Dr. Bigelow first noticed the curious fact that when the spiculæ are applied to the interior of the mouth, they excite none of the peculiar effects just de-Thus we have explained the comparative innocuousness of the medicine when taken medicinally. Even in large doses its effects are slight. Chamberlain states that his child of five years old swallowed by stealth three or four ounces of syrup filled with cowhage, but no inconvenience resulted beyond a diarrhœa, "which did more good than harm." To relieve the itching of the skin caused by this substance, the spiculæ may sometimes be removed by means of a mixture of plaster of Paris and water allowed to harden upon the part. When it is removed, it carries the spiculæ with it. This method would not be applicable to hairy portions of the skin. Frictions with a mixture of oil and ashes have also been recommended, and rubbing the part with the pile of a fur hat.

Uses.—As a vermifuge, there is no doubt that the irritant properties of cowhage led to its being originally employed. It is generally supposed to act mechanically upon intestinal worms, irritating and wounding them and obliging them to yield to the peristaltic action of the intestine.⁵ This was Chamberlain's view, and also Bancroft's. The

^{*} Kuchenmeister gave a drachm of cowhage in syrup to a dog, who afterwards voided some fragments of tænia. Other doses were given to the amount of half an ounce. The animal was then sacrificed, and a tænia in his bowels was found quite lively, but, perhaps, rather less firmly attached than usual to the mucous membrane.

day half of this quantity was given. On the fifth day the purgative infusion was repeated. The result is described as having been almost uniformly successful. It may, perhaps, be suspected that such quantities of an irritant substance might injure the bowel, and, indeed, cases are recorded of bloody vomiting apparently produced by it. In one, also, fatal obstruction of the bowel is ascribed to its use.'

Later writers claim to have been successful with smaller doses. Thus Mead, who recommends tin filings as "very efficacious," directs one drachm of them, with an equal quantity of red coral, to be reduced to a fine powder and made into a bolus with conserve of wormwood. Of this preparation a drachm twice a day was the dose. Brera says that in cases of old, large, armed tæniæ, tin filings regularly administered produce the effect promptly and certainly, even when the preparations of male fern are ineffectual. Mayor, of Geneva, assures us that tin is one of the surest remedies for these parasites. He directs a scruple at a dose, mixed with honey; but states that an ounce may be given if necessary. Other successful cases are reported by Fordyce, Pallas, Monroe, Rudolphi, Bremser, Bloch, &c. Sometimes an amalgam of tin and mercury has been used. This was done by Spilman, who also added carbonate of lime and of magnesia, and made of the whole an electuary with conserve of wormwood.

These are sufficient proofs of the efficacy of tin as a remedy for worms. Its mode of action is in dispute. It is generally supposed to act by its physical or mechanical properties, subjecting the worms to a rude attrition which destroys them. On the other hand, the juices of the bowels are supposed to form with the metal salts which are poisonous to the parasites. The property which wine is said to acquire by contact with tin has already been alluded to, and, moreover, Callisen, Geoffroy, and Alibert, assert that some of the salts of this metal are anthelmintic. It, indeed, seems probable that its chemical must be added to its mechanical action in accounting for its effects. True, they have been called in question by Kuchenmeister, in consequence of his experiments upon dogs. But his results are of comparatively little weight against the multiplied and various experience of physicians.

FILIX MAS .- MALE FERN.

DESCRIPTION.—"The rhizoma of Aspidium Filix mas."

This is a crytogamic plant, of the Nat. Ord. Filices, which abounds in the temperate regions of the old and the new world. It is, however, doubted whether the American is identical with the European plant. Its leaves, which are annual, are bipinnate, but the root, or rhizome, is perennial. It is from six to twelve inches long, and about an inch thick in its recent state, and when enveloped by the imbricated

¹ RICHTER, Ausfürlich. Arzneim., iv. 555.

² Med. Works, p. 383.

⁵ Treat. on Verminous Diseases (Am. ed.), p. 238.

⁴ Dirrbach, Neuste Entdeck., iii. 318. ⁶ CLARUS, Arzneimittellehre, p. 877.

tænia prevails; but, as Brera himself related, the armed tænia, when young, will not always resist the medicine. Subsequent observations have gone farther, and shown, particularly as regards the extract of male fern, that it is capable of removing both species, although the armed tænia may somewhat more obstinately resist its influence.

So much stress is laid upon systematic administration of male fern by all who have used it most extensively that we shall describe several of the most approved methods. Wawruch treated two hundred and six cases, nearly all of tænia solium, according to the following plan. Preparative treatment.—During four or five days a solution was every day given containing twenty grains of sal ammoniac; the patient meanwhile taking no food but a thin broth at each meal. Expulsive treatment.—The night previously a simple injection was given. The following morning a bowl of thin soup without salt was eaten, followed in an hour by two ounces of castor oil in two doses. In the interval between these from half a drachm to a drachm of powdered male fern was administered in two or three doses, and an enema of milk and oil. Some time after the last dose of fern a drastic purge of calomel and gamboge was given, and under its operation the tænia was generally discharged. This method occasioned a good deal of pain and often vomiting, rendering the use of emollients and narcotics necessary.' The treatment pursued by Albers, of Bonn, and which proved successful in a large number of cases, was almost exactly the same as that just described, except that the ethereal extract was the preparation of fern employed. Lambert preceded the administration of the fern by a diet of herring, onions, and similar crude articles.3 Trousseau's method, which he states was very successful, is as follows: First day, absolute milk diet; second day, fifteen grains of the ethereal extract of male fern to be taken fasting and repeated every quarter of an hour until four doses are taken; third day, repetition of the extract as on the preceding day. After the last dose about two ounces of syrup of ether, and, in half an hour later, an emulsion containing three drops of croton oil.

Since the introduction of the extract of male fern there does not seem to be, as indeed Peschier distinctly pointed out, any need of resorting to disgusting and violent, if not hazardous methods, such as that of Wawruch, or of Nuffer, which was still more complicated. The medicine appears to act as a poison to the animal and destroy it, whereupon its expulsion follows through the natural action of the intestine, or on the administration of a simple laxative. We can now, with our actual knowledge of its vermicide power, say with more emphasis than even Murray did, "Sufficit scire quid efficiat etiamsi modus nos lateat."

It occurred to Peschier, that the oil (or volatile extract) which Morin had discovered in male fern might possess its anthelmintic properties, and he accordingly administered it in doses of from eight to twenty or thirty drops, followed by a mild purgative, and with such perfect suc-

¹ Arch. Gén., 4ème sér., i. 207; Brit. and For. Med. Rev., xviii. 328.

Bull. de Thérap., xxv. 76. Ibid., xlii. 364.

⁴ Rev. Méd., xx. 268.

offensive taste. When fresh, the oil has a light yellow color, but it

grows darker by age.

HISTORY.—Wormseed appears to have been first used in Virginia as an anthelmintic. Dr. Wilkins, of Baltimore, writing in 1828, stated that for thirty years it had been employed in this manner. It is still much used among the negroes of the South; but there, as elsewhere,

it has been gradually supplanted by the essential oil.

Uses.—According to Chapman, all parts of the plant possess vermifuge properties, and Eberle says that a tablespoonful or two of the expressed juice, given two or three times a day, is occasionally employed for children. But this preparation is even more disagreeable than the oil. Eberle employed the latter with success to expel lumbricoid worms after the failure of other medicines. Dewees recommended it, provided there was no fever present. Dr. Condie employed it in some cases with decided advantage. Long ago Wilkins said that "in various instances where parents have erroneously supposed worms to exist, this fine stimulating oil has removed general debility, indigestion, and colic, with various other unsuspected disorders, and has restored health to the little patient." Dr. J. F. Meigs has been struck with similar qualities in the medicine, for he says,2 "It not only produces the expulsion of the parasites when they exist, but also acts beneficially upon the forms of digestive irritation which simulate so closely the symptoms produced by worms." Dr. Monsarret, of Kibeggan, has reported the particulars of a case of tænia cured by this oil, and says there are many other cases in which he has used it with complete success.3

The oil of chenopodium has also been used in intermittent fever,

hysteria, chorea, and other nervous affections.

Administration.—The expressed juice, when fresh, may be given in tablespoonful doses twice or thrice daily. A decoction made by boiling an ounce of the leaves in a pint of milk or water has also been used. The bruised or pulverized seeds are given in an electuary, in doses of twenty or more grains three times a day. It is often useful to combine carbonate of iron with this preparation. The dose of the oil (OLEUM CHENOPODII) is five or ten drops three times a day for a child three years old. It may be mixed with powdered sugar or in an emulsion. Whatever preparation is selected, after two or three days' use of it, a dose of castor oil should be given.

SANTONICA.—SANTONICA.

This medicine consists of the unexpanded buds of Artemisia contra, which grows in Persia and the adjacent countries, and of other species of Artemisia. It is said to have been introduced into European practice by the Crusaders. When rubbed, it emits a strong, peculiar, and somewhat aromatic smell, and it has a warm, bitter, and spicy

Coxe's Med. Museum, v. 252.

Diseases of Children, 2d ed., p. 695. ³ Med. Times, Dec. 1844, p. 140.

Dr. Rose, of Berlin, instituted a large number of experiments by which he claims to have shown that the violet and then yellow color which covers the field of vision during the use of santonin, is due, not to any actual change in the color of the media by which the rays of light reach the retina, but to an altered perceptivity in the nervous organ of vision itself.¹

In doses of more than three grains, santonin sometimes occasions nausea and vomiting, with abdominal pain, great thirst, giddiness, and profuse diarrhœa.2 Decidedly poisonous effects sometimes arise from doses which are quite insignificant in comparison with those which some experimenters have taken without serious inconvenience. In one case it is stated that a child six months old and convalescent from smallpox took five grains of santonic acid instead of three which had been prescribed. It became amaurotic, and did not recover its sight for two months.3 In another case two grains of this substance were taken at a dose by a healthy child of two years. In a quarter of an hour it was seized with convulsions, and within one hour it lay unconscious, with a hot head and congested face, the eyes twitching convulsively, the pupils largely dilated and insensible, the mouth foaming, the teeth clenched, the breathing stertorous, and the upper limbs occasionally jerking. On the morrow recovery was complete.4 This resembles two cases in which Hoffmann witnessed such alarming cerebral symptoms after the administration of santonica, that he was obliged to apply leeches to the temples and cold compresses to the head.' These examples are sufficient to illustrate the somewhat uncertain operation of santonic acid both in degree and in kind, and to suggest caution in its administration.

Uses.—Santonica possesses decided anthelmintic properties, as its title of semen contra, i. e., semen contra vermes, plainly shows. It is generally successful in destroying lumbricoid and vermicular ascarides, and, in some instances, it has procured the discharge of the tapeworm also. Santonin is even more certain in its effects. Numerous reports of its efficacy have been published by Perry, Bishop, Garnies, Smith, More, and others. Santonic acid has been used with alleged advantage in subacute and chronic inflammations of the choroid and retina, but precise and reliable information upon the subject is still wanting.

The dose of this medicine in powder is from ten to sixty grains three or four times a day. It may also be prescribed in either of the forms recommended for chenopodium. Of santonin from three to six grains may be given to an adult, or from one to three grains to a child, mixed with sugar, every four hours until three or four doses have been taken, when they should be followed by a dose of castor oil.

- Virchow's Archiv., xviii. 24.
- Bull. de Thérap., lviii. 519.
- Frank, Magazin der Arzneim., i. 40.
- ⁷ Ibid., July, 1856, p. 22.
- Lancet, April, 1859, p. 349.
- ² Lancet, April, 1859, p. 402.
- ⁴ Annuaire de Thérap., xxii. 180.
- ⁶ Times and Gaz., May, 1856, p. 492.
- Annuaire de Thérap., 1857, p. 235.
- 16 Ibid., p. 402.

or less worms were discharged. He also relates a case of tænia which was cured by its use. These facts, and others which might be cited, demonstrate the possession of real anthelmintic virtues by this plant.

Of the other uses of tansy, in hysteria, gout, rheumatism, and dropsy, it is needless to say anything, as other more appropriate and powerful remedies for them are at hand. The popular use of the medicine to overcome irregular or suppressed menstruation arises, no doubt, from its general stimulant property, and not from its specific emmenagogue virtues. In the cases of poisoning by oil of tansy already alluded to, the medicine had been taken with the criminal purpose of producing abortion, but without avail.

ADMINISTRATION.—The dose of the powder of the seeds of tansy is from ten to forty grains, of the flowers, from twenty to one hundred and twenty grains. An infusion made by adding from half an ounce to an ounce of the seeds, or twice that quantity of the flowers to a pint of boiling water, may be given in doses of one or two ounces. Of the oil, the dose is from one to four drops, or more.

GRANATI FRUCTÛS CORTEX.—Pomegranate Rind.

GRANATI RADICIS CORTEX.—BARK OF POMEGRANATE ROOT.

DESCRIPTION.—The pomegranate tree, Punica Granatum, is a native of the South of Europe, Barbary, Arabia, Persia, and Japan, and is cultivated in the West Indies and the United States. It is a small tree, but in favorable situations often rises to the height of eighteen or twenty feet. The leaves are of a light-green color, pointed at either end, and about three inches long by half an inch broad in the middle. The flowers are of a beautiful red color, but have no smell. The fruit is about the size of an orange; its rind is extremely hard and tough, and of a reddish-brown color. It contains a subacid and succulent pulp, and numerous seeds.

As found in commerce, pomegranate flowers (balaustines) have a bitter and astringent taste. The rind of the fruit occurs in irregular fragments which are very hard and brittle, of a reddish-brown color externally, but paler within. The bark, as found in the shops, is in quills or fragments of a grayish-yellow color externally, and yellow within. It is inodorous, has an astringent taste without bitterness,

and, when chewed, colors the saliva yellow.

The analyses of pomegranate rind and bark have not furnished very definite results. The former would appear to contain the larger proportion of tannin, the latter of a fatty matter described by Wackenröder'as "rancid fat oil." It is probably on this oil, as well as upon tannin, that the vermifuge qualities of the medicine depend.

HISTORY.—Pomegranates were among the most anciently known of fruits. They are mentioned, along with grapes and figs, among the productions of "the land of promise." Homer enumerates them among

Ainslie' tells us that the Mahometan physicians in India (whither it was introduced from Persia) consider it a perfect specific in cases of tapeworm. They give it in decoction prepared with two ounces of fresh bark boiled in a pint and a half of water, until three-quarters of a pint remain. Of this, when cold, a wineglassful may be drunk every half hour, until the whole is taken. The most complete account of the curative effects of the medicine are contained in the memoir of Mérat, already referred to, and which contains a summary of one hundred and ninety-two cases cured by the bark of the root. M. Mérat asserts that it never fails if administered according to the following rules: It ought never to be given unless the patient has actually voided some joints of the worm, and then, if possible, on the following day. The decoction ought always to be made of the fresh bark of the root, and prepared as follows: Take two ounces of the bark and let it soak over night in a pint and a half of water, and then by gentle boiling reduce it to a pint; strain off the liquor, expressing the grounds, and give it lukewarm in three doses, at intervals of an hour, before the patient has broken his fast. No purgative or other treatment need precede or follow that which has been described. If the first dose is vomited, the others should still be administered, and they will generally be retained; but if all are rejected, the treatment must be renewed on a subsequent occasion.

For the purposes of an astringent medicine merely, the rind of the fruit is most frequently employed, as in the treatment of chronic diarrhea, leucorrhea, and passive hemorrhages. Its decoction may be used as an injection in open cancer of the uterus and ulcerous diseases of the rectum, accompanied with a bloody discharge. It also forms an excel-

lent gargle in relaxed states of the fauces.

ADMINISTRATION.—The dose of the rind or flowers in powder is from twenty to thirty grains. The officinal decoction of the root (Br. Ph.) is prepared by boiling two ounces in two pints of water, to a pint. One-third of this quantity may be given every hour. The preparation of the bark of the fresh root, as advised by Mérat, is more efficacious.

ABSINTHIUM. - WORMWOOD.

DESCRIPTION.—Absinth (Artemisia absinthium) is a perennial plant, which is native in all parts of Europe, except the extreme north, and grows wild in open places. It has been naturalized in the United States. The tops and leaves are officinal. They have a hoary look, a soft, silky feel, a strong aromatic odor, and a bitter and aromatic taste, qualities which are due to the presence of a green essential oil, and a bitter, resinous principle, called absinthin.

HISTORY.—Wormwood appears to have been very anciently and very extensively employed. In the Bible it is several times referred to as a type of bitterness. Hippocrates describes it as an emmenagogue.

Externally the decoction of wormwood has been used as a dressing for indolent and other unhealthy ulcers.

ADMINISTRATION.—In substance, the dose of wormwood is from twenty to forty grains. An infusion, made by macerating one ounce in a pint of boiling water, may be given in doses of one or two fluidounces. The dose of the essential oil is from four to eight drops in a sweetened mixture with ether or sweet spirit of nitre.

BRAYERA.—Koosso.

DESCRIPTION.—This vermifuge, which is now officinal, consists of the dried flowers and unripe fruit of Brayera anthelmintica, a native tree of Abyssinia. On analysis, they are found to contain, as the apparently active components, a fatty oil, an acrid resin, tannin, and a principle called koossine. As procured by Pavesi, and afterward by Vée, it is represented to be yellow, bitter, insoluble in alcohol and in alkalies, and uncrystallizable. St. Martin had previously described it as forming white, acicular crystals, soluble in alcohol, ether, and acids.

HISTORY.—The first mention of koosso appears to be that made by Godingus (1615), who states that the Abyssinians employ it annually to purge themselves of worms, which appear to be singularly prevalent among these people. Subsequently (1790) the celebrated traveller, Bruce, confirmed this statement, and furnished a drawing of the tree from which the medicine is derived. In 1823 Brayer, a French physician, on his return to France from Constantinople, where he had resided for several years, brought with him some flowers of koosso, whose tænifuge powers he had tested. Specimens of the plant and accounts of its use were afterwards sent from Abyssinia by Schimpfer, and it was employed with various success by Plieninger, Kurr, and Riecke. In 1840 a memoir treating in part of this plant was read before the Parisian Academy of Medicine by Aubert, who had experienced its benefits in his own person during a residence in Abyssinia. Of its use in Africa, Mr. Vaughan, a surgeon of the East India Company stationed at Aden, on the Red Sea, says: "In Southern Arabia, on the seacoast, and along the shores of the Red Sea it is well known and considered a most valuable medicine. In Northern and Southern Abyssinia it is universally used about once a month, the trees being numerous, and the medicine costing hardly anything. Bruce mentions that no Abyssinian will travel without it. The few Abyssinians who visit the port of Aden invariably bring with them a supply."

In 1847 Mérat reported five cases of its efficacy observed by himself, Chomel, and Guéneau, and others were published by Sandras.

^{&#}x27; Bull. de Thérap., xxiv. 285.

² Pereira, Mat. Med. (3d Amer. ed.), ii. 804.

Bullet. de l'Acad., vi. 492.

RIECKE, Neue Arzneim., p. 101.
Lancet, Sept. 1850, p. 305.

Bull. de l'Acad. de Méd., xii. 690.

⁷ Annuaire de Thérap., 1847, p. 256.

SPIGELIA.—SPIGELIA.

DESCRIPTION.—The root of Spigelia Marilandica. This plant is a native of the southern and southwestern States of the Union. It grows in dry, rich soils on the borders of woods. It has a quadrangular, smooth, and purplish stem; the leaves are opposite, sessile, ovate, glabrous in the centre and pubescent on the edges. The flowers form a terminal raceme. The corolla is funnel-shaped, red externally and orange within. The root consists of numerous slender, blackish fibres arising from a thick and knotty rhizome. Its odor is faint but peculiar, and its taste is sweetish and somewhat bitter. According to Feneulle, the root contains a fixed and a volatile oil, some resin, and a peculiar bitter substance, gallic acid, &c. It is said to lose its active properties by keeping.

Other species of spigelia possess anthelmintic powers, and S. anthelmia in even a greater degree than the officinal plant. This species grows in Jamaica, and is regarded as an infallible remedy for worms by the inhabitants. It displays very decided narcotic and stimulant

properties.1

The officinal preparations of spigelia are the following:—

Extractum Spigeliæ et Sennæ Fluidum.—Fluid Extract of Spigelia and Senna.

This extract is prepared by mixing ten fluidounces of fluid extract of spigelia with six fluidounces of fluid extract of senna, and adding carbonate of potassa, and oils of anise and caraway. Dose, for an adult, half a fluidounce, for a child, a fluidrachm.

Infusum Spigeliæ.—Infusion of Spigelia.

Macerate half a troyounce of spigelia in a pint of boiling water for two hours in a covered vessel, and strain. Dose, for an adult, from four to eight fluidounces; for a child of three or four years old, from half a fluidounce to a fluidounce.

HISTORY.—Spigelia appears to have been used medicinally by the aborigines, from whom Lining derived a knowledge of its virtues in 1754. It was also early recommended by Garden and Chalmers, of South Carolina.

Action.—Some authors ascribed purgative powers to this medicine.³ Barton, on the contrary, recommended that its action should be quickened by the addition of a purgative, and Chapman advises the same combination, but with a view of counteracting its narcotic operation. Wright first pointed out its narcotic properties, and Barton attributed cases of death to its employment. Two fatal cases were published by Chalmers. Chapman attributed its efficacy as a vermifuge to its narcotic influence on the intestinal worms. Dr. Ives adopted a similar view, and believed that it first stupefies and then expels these entozoa. He further compared the action of the fresh root to that of digitalis and stramonium. Like the former, it quiets general nervous irritation,

¹ Browne, Med. Museum, 2d ed., 1781, i. 221.

² Home, Clinical Experiments, p. 465.

purge. The most usual and the best form of the medicine is that commonly known as worm tea; viz., R.—Spigelia half an ounce; senna and fennel seed, of each one hundred and twenty grains; manna one ounce; boiling water one pint.—Infuse. Half a wineglassful three times a day to a child two years old. The compound fluid extract is less disagreeable and nearly as efficient. The dose is from one to four fluidrachms.

AZEDARACH. — AZEDARACH.

DESCRIPTION.—This medicine (which belongs to the secondary list of the U.S. Pharmacopæia) is the bark of the root of Melia Azedarach, a tree which is a native of Asia, but is naturalized in Southern Europe, and the southern States of the Union. It is generally known under the name of Pride of China or Pride of India, and is remarkable for its beautiful foliage and flowers, which have caused it to be used as a shade tree in several southern cities. It grows to a height of thirty or forty feet. The leaves are large, bipinnate, with dark green leaflets disposed in pairs. The flowers are of a light violet color, arranged in clusters near the extremity of the branches. Their odor, according to some authorities, is "disagreeable," and according to others "delightfully fragrant." The fruit is an ovoid fleshy berry, about the size of a cherry, and containing a nut with five seeds. The bark of the root has a bitter and nauseous taste and a virose smell.

HISTORY.—The poisonous properties of azedarach were well known to the Arabian physicians, one of whom enumerates among the symptoms which an overdose of it produces—faintness, confusion of mind, giddiness, dimness of sight, and vomiting. No mention is made of its vermifuge properties, but diuretic qualities are ascribed to it. It was chiefly used to promote the growth of the hair, and to cure eruptions of the scalp. A modern writer praises the virtues of an ointment made with the pulp of the fruit in tinea capitis and to destroy lice. Thacher mentions its being thus employed in the United States, and Michaux refers to its use in Persia for similar purposes.

ACTION. On Animals.—Birds devour the berries greedily and without harm. Cows have sometimes eaten the leaves in large quantities with but trifling inconvenience. Dogs appear not to be affected by them; horses eat them with impunity, and the trees are sometimes planted around stables that these animals by eating the berries may be prevented from having the "bots."

On Man.—The poisonous action of this medicine bears a close resemblance to that of spigelia. In a case described by Dr. Kollock, the symptoms were stupor, dilated pupils, stertorous breathing, and subsultus. In another, mentioned by Tournon, there were convulsions, grinding of the teeth, cold sweat, vomiting and purging. Porcher,

¹ EBN BAITHAR, ed. Sontheimer, i. 30. ² Coxe, Am. Dis., p. 128.

MERAT and DE LENS, Dict., iv. 290.

⁴ Porcher, Trans. Am. Med. Assoc., ii. 723.

^{*} EBERLE, Therapeutics, p. 156.

be strained through a cloth. To be taken at one dose, fasting. If it does not operate within an hour and a half, take a dose of castor oil; and if unsuccessful, repeat the same on the following day. Cases of cure by these means began to multiply. The reader is referred to those of Mr. Craigin, Rev. J. H. Hill, Dr. Ely, and Dr. De Forest, who cured numerous cases in Syria. An interesting one was published by Dr. Patterson, of Philadelphia. For six years the patient had been tormented by his disease, and the use of all known remedies, including male fern, calomel and jalep, iodide of potassium, iodide of iron, decoction of pomegranate, and kousso. During this period he had voided upwards of four hundred yards of the worm. Finally he took two ounces of powdered pumpkin seeds with two tablespoonfuls of white sugar, infused in half a pint of boiling water. Within an hour and a half, an ounce of castor oil was administered, and in less than an hour afterwards, the worm, with the head, was discharged.

In 1852, two French physicians, MM. Brunet and Lamothe, apparently without any knowledge of the above mentioned results, also cured patients of tænia by means of a paste or emulsion of pumpkin

seeds.6

In 1854, Dr. Leasure, of Newcastle, Pennsylvania, reported a successful case, and in the following year a second occurring in the mother of his former patient. Dr. Putnam, of Boston, also furnished another example of the tænifuge properties of pumpkin seeds, which was followed by those of Ely, Carpenter, Soule, Hunt, Cazin, Reimonecq, and others. It is unnecessary to refer to any other particular examples. They might be almost indefinitely multiplied. The original success of the medicine has been more than confirmed by prolonged experience.

The fixed oil contained in the seeds is supposed to possess their anthelmintic virtues. It was used with success by Mr. J. C. Lyons, of Philadelphia, in the dose of half an ounce repeated in two hours, and followed in two hours more by a dose of castor oil. This oil may be obtained by cold expression from the seeds in the proportion of nearly an ounce to the pound. It is clear, transparent, of a light brownish-green color, with a slight oily odor, and a perfectly bland

taste, like that of the oil of sweet almonds.

ADMINISTRATION.—From one to two ounces of pumpkin seeds, as fresh as possible, should be deprived of their outer envelop and beaten to a paste with finely powdered sugar, and diluted with water, or milk when taken. In order to secure its successful operation, no

⁷ Am. Jour. of Med. Sci., July, 1854, p. 281; and ibid., June, 1855, p. 269.

Boston Med. and Surg. Jour., Nov. 1851, p. 274.
 Ibid., April, 1852, p. 222.
 Ibid., July, 1852, p. 500, and Oct. 1852, p. 216.
 Ibid., Sept. 1852, p. 143.

Med. Examiner, Oct. 1852, p. 630.
 Annuaire de Thérap., 1852, p. 301.

^{*} Ibid., Oct. 1854, p. 378.

* Boston Jour., Feb. 1856, p. 16.

* Boston Jour., Feb. 1856, p. 16.

* Ibid., March, 1859, p. 116.

¹² Am. Jour. of Med. Sci., April, 1859, p. 374.

¹³ Bull. de Thérap., lv. 234.
¹⁴ Lancet, March, 1859, p. 254.
¹⁵ Philad. Med. Exam., Oct. 1853, p. 630.

discharged under its influence were generally quite alive. This discrepancy may, perhaps, depend upon a difference in the doses administered by the several physicians referred to.

Mr. Leared claims that the medicine is efficacious against all sorts of worms, and is incomparably superior to all other remedies for threadworms and large round worms. Dr. Moore thinks that it is also

useful in diseases of the skin.

ADMINISTRATION.—The dose of the powder of kamela is from sixty to one hundred and eighty grains. Dr. Gordon states that in India he employed a saturated tincture in the dose of one, two, or three fluidrachms, diluted with a little cinnamon water. The alcoholic extract is preferred by others; as above stated, about four grains of it are yielded by one fluidrachm of the tincture. Whatever preparation is used should be repeated, in the doses mentioned, every three hours until five or six doses are taken. As the powder of kamela is apt to gripe, it should be associated with a small quantity of hyoscyamus.

SAORIA.—This is the dried herb of Mæsapicta, an Abyssinian shrub. It is taken in powder mixed with porridge, and in the dose of an ounce or an ounce and a half. It gives a violet tint to the urine, and occasions some nausea, and also liquid stools. Dr. Strohl, from whom these particulars are derived, is of opinion that it is a more certain tæniafuge and tæniacide than the remedies of the same class indigenous to France. Kuchenmeister regards its action as uncertain.

ZATZE, or Tatze, is the fruit or undeveloped drupe of Phytolacca dodecandra, a native shrub of many parts of Africa and of the Azores. It has a persistently acrid and disagreeable taste, and is apt to produce vomiting and purging. Dr. Strohl found it partially successful in six cases of tænia. He administered from four to six drachms of the powder in a liquid vehicle.

OLEUM TEREBINTHINÆ, vid. General Stimulants.

³ Bull. de Thérap., xlvii. 17, 71.

¹ Times and Gaz., Jan. 1859, p. 56.

Annuaire de Thérap., xv. 261; Brit. and For. Med.-Chir. Rev., July, 1858, p. 243; Kuchenmeister, Syd. Soc. ed., i. 154.

probably he did not suspect the curative powers of this metal to be very great unless such an effect were produced by it. But it must be remembered that iodine, chlorine, colchicum, and arsenic, an observation of whose effects has chiefly led to the formation of the present class of alterative medicines, were unknown in Hoffmann's time, and the molecular changes which occur in nutrition were still undiscovered. Yet his doctrine, that alterative medicines promote the elimination of certain morbid matters from the body, is substantially in accordance with the conclusions of modern science.

Even now, physicians are not perfectly agreed what medicines to include in the class of alteratives. Some embrace under that denomination colchicum, guaiacum, mezereon, dulcamara, soda, potassa, sulphur, chlorine and its compounds with soda and lime, and others the vegetable acids, and the preparations of silver, zinc, copper, and lead. But all of these agents display properties which are more important than any which can be called alterative, and practical considerations, therefore, seem to determine their position elsewhere. Thus, colchicum acts upon the renal secretion chiefly, and hence belongs to the class of diuretics; guaiacum mainly on the skin, and, therefore, is ranked with diaphoretics, &c. Even chlorine, which has so strong a chemical and physiological analogy with iodine, differs from it entirely in those respects which render iodine so valuable a remedy. What has been urged in the Introduction to this work, and repeated elsewhere, need not now be insisted upon—that the arrangement which is most convenient and useful in practice is the best in a practical treatise. Were the theory of medicinal agents perfected, its principles would of themselves constitute the most valuable practical precepts; but such a consummation, however desirable, is an utopian vision, if not an impossibility.

Throughout this work we have endeavored to keep prominently in view the principle that experience is the only safe guide in therapeutics. In attempting to elucidate the operation of many medicines, we have been enabled to seize with more or less confidence the link that connects their sensible operation with the cure which follows it. But in the present case that rational link is almost entirely wanting, and we are reduced to forming conjectures respecting its nature, derived from the effects of alterative medicines upon the economy when they are administered in excessive doses, and from our imperfect knowledge of the intimate nature of the diseases in which their curative power has been demonstrated by experience.

Now, it is a remarkable fact that mercury, arsenic, iodine, bromine, muriate of ammonia, soda, and potassa agree in this, that when given for a considerable period, which varies for them individually, they diminish the proportion of fibrin in the blood, or its crasis, or plasticity, as it is sometimes termed, and, at the same time, promote the waste of the solids. Yet the external phenomena which accompany this change are not the same in each case. Mercury causes a general disintegration of the solids, iodine a wasting of them, and especially of glandular organs, arsenic a flaccidity of the tissues, with a watery state of the blood, and the alkalies a dissolution of the corpuscles of this fluid, as

ployed too lavishly, or too long, their destructive exceeds their curative operation; not only do they remove the particles whose discharge is essential to a cure, but they attack the sound tissues, and cause their separation also. In the case of several, this excessive activity is manifested by morbid phenomena of a definite character; mercury produces salivation, iodine a peculiar intoxication and wasting of glandular structures, arsenic serous effusions, alkalies a scorbutic condition, &c.

There is a fact which is not without weight in determining which of the two preceding hypotheses inclines towards the side of probability. It is well known that for the cure of the primary phenomena of syphilis mercury is almost useless, and, indeed, is usually mischievous whenever it is applied to the treatment of these symptoms in persons of a feeble or cachectic constitution. Secondary syphilis, on the other hand, affecting the mucous membranes and the skin, is treated with incomparably better results by mercury than by any other single medicine, while the tertiary forms of the disease, seated in the fibrous tissues and the bones, yield to iodide of potassium much more readily than to mercury. Now, if mercury were the specific antagonist and antidote of the venereal poison, it should act as such in all cases and stages of the disease; but if, instead of regarding it as adapted to neutralize a material poison, as an alkali neutralizes an acid, we assume either that the tissues which admit mercury will not admit iodide of potassium into their minute recesses, or vice versa; or else that the affinity of the two medicines is different for the two sorts of structure involved in the disease, in a word, that the one is competent, and the other is not, to accomplish the due degree of waste and repair in the diseased tissues, we adopt an explanation which is consistent with the facts of the particular case, and with the analogies presented by alterative medicines in their action upon the skin and mucous membranes, when administered in large doses. The idea which Hoffmann entertained of the operation of diluent alteratives was substantially that which is here set forth, and it is the same which we have elsewhere maintained as the most plausible explanation of the efficacy displayed by pure and slightly mineralized waters, and, above all, by the water-cure, in the treatment of many chronic diseases.

It is a further argument in favor of this hypothesis, that alterative medicines act, to a great degree, in the same direction as the diseases which they cure; that mercury, for example, tends to produce lesions which bear a close resemblance to, if indeed they are not identical with, those caused by syphilis. Just as a caustic, which is capable of occasioning an ulcer, is the most appropriate agent for healing an ulcer which has fallen into an indolent condition, provided it be applied in a degree duly proportioned to the imperfect vitality of the affected part. If too slightly used it is inefficient, if too actively applied, it extends and deepens the original sore, just as alterative medicines in proper doses seem gently to remove the obstacles to recovery, but too profusely administered, undermine the strength of the system, and institute destructive instead of sanative processes.

Unguentum Hydrargyri.—Mercurial Ointment.

The directions for making this ointment are to take twenty-four troyounces of mercury, lard and suet of each twelve troyounces; rub the mercury with a troyounce of suet and a small portion of the lard until the globules disappear, then add the remainder of the lard and suet softened by a gentle heat, and mix them.

Hydrargyri Oxidum Rubrum.—RED OXIDE OF MERCURY; RED PRECIPITATE.

A portion of the nitric acid is decomposed, forming an oxide of mercury with which another portion of the acid unites. On the application of heat nearly all of the nitric acid is driven off, leaving a deutoxide of mercury mixed with a variable proportion of the nitrate. This oxide consists of one equivalent of mercury and two of oxygen, is an orange red powder, and has a disagreeable metallic taste. It is soluble in nitric and muriatic acids, but is very slightly so in water.

Unguentum Hydrargyri Oxidi Rubri.—Ointment of Red Oxide of Mercury; Red Precipitate Ointment.

This ointment consists of sixty grains of the red oxide of mercury finely powdered, and a troyounce of ointment of lard.

Hydrargyri Sulphuretum Rubrum.—Red Sulphuret of Mercury; Cinnabar.

One part of melted sulphur to five of mercury, by weight, are mixed over the fire. When cold the mass is reduced to powder and sublimed. Cinnabar is composed of one equivalent of mercury and two of sulphur. It is usually in the form of dark red crystalline masses, of brilliant aspect and fibrous texture. Reduced to powder it forms the pigment vermilion. It is inodorous and tasteless, and is insoluble in water, alcohol, or ether. Its sp. gr. is 8.1.

Hydrargyri Chloridum Mite.—MILD CHLORIDE OF MERCURY; CALOMEL.

"Take of Mercury, forty-eight troyounces; Sulphuric Acid, thirtysix troyounces; Chloride of Sodium, eighteen troyounces; Distilled Water, a sufficient quantity. Boil twenty-four troyounces of the Mercury with the Sulphuric Acid, until a dry, white mass is left. Rub this, when cold, with the remainder of the Mercury, in an earthenware mortar, until they are thoroughly mixed. Then add the Chloride of Sodium, and having rubbed it with the other ingredients until the globules cease to be visible, sublime the mixture. Reduce the sublimed matter to a very fine powder, wash it with boiling Distilled Water, until the washings afford no precipitate upon the addition of solution of Ammonia, and dry it." U.S.P. By the first step in this process, a persulphate of mercury is formed, which by trituration with mercury, is converted into the subsulphate. By the trituration and sublimation of the latter with chloride of sodium, calomel or subchloride of mercury is sublimed, and the residuum is sulphate of soda. The calomel is then finely powdered and washed, to free it from the bichloride, which is known to be entirely removed when ammonia ceases to give any precipitate with the washings.

Hydrargyrum Ammoniatum.—Ammoniated Mercury; White Precipitate.

This compound is procured by precipitation with ammonia from a solution of corrosive sublimate, and is described as an ammonio-chlo-

ride of mercury.

Ammoniated mercury is in the form of a coarse snow-white powder of a styptic metallic taste, but without smell. It is insoluble in water and alcohol, but is decomposed by boiling water, and is dissipated by a strong heat. White precipitate may be distinguished from calomel by a solution of ammonia, which does not alter the former, but blackens the latter.

Unguentum Hydrargyri Ammoniati.—OINTMENT OF AMMONIATED MERCURY.

It is made by mixing forty grains of ammoniated mercury in fine powder with a troyounce of ointment of lard.

Hydrargyri Iodidum Viride.—Green Iodide of Mercury.

A troyounce of mercury is triturated with three hundred grains iodine reduced to a paste by means of alcohol, until combination between the two bodies ensues. As prepared for use, iodide of mercury is a powder of a dull greenish-yellow color, insoluble in water and alcohol, but soluble in ether. It is without smell or taste.

Hydrargyri Iodidum Rubrum.—Red Iodide of Mercury.

This preparation is procured by precipitation from a solution of bichloride of mercury by means of iodide of potassium, the chloride

of potassium remaining in solution.

Deutiodide of mercury may be obtained in rhomboidal crystals by sublimation, but is usually in the form of a brilliant scarlet powder, of a slight metallic taste, but without odor. It is insoluble in water, but is soluble in alcohol and acids with the aid of heat; also in a boiling solution of chloride of sodium, and in a solution of iodide of potassium.

Liquor Arsenici et Hydrargyri Iodidi.—Solution of Iodide of

ABSENIC AND MERCURY; DONOVAN'S SOLUTION.

This is a solution of iodide of arsenic and red iodide of mercury, each thirty-five grains, in half a pint of distilled water.

Hydrargyri Cyanidum.—CYANIDE OF MERCURY.

"Take of ferrocyanide of potassium, five troyounces; sulphuric acid, four troyounces and one hundred and twenty grains; red oxide of mercury, in fine powder, water, each, a sufficient quantity. Dissolve the ferrocyanide of potassium in twenty fluidounces of water, and add the solution to the sulphuric acid, previously diluted with ten fluidounces of water, and contained in a glass retort. Distil the mixture nearly to dryness into a receiver containing ten fluidounces of water and three troyounces of red oxide of mercury. Set aside two fluidounces of the distilled liquid, and to the remainder add, with agitation, sufficient red oxide to destroy the odor of hydrocyanic acid. Then filter the solution, and having added the reserved liquid, evaporate the whole in a dark place in order that crystals may for Lastly, dry the crystals, and keep them in a well-stopped bottle, tected from the light."

the skin. Ainslie remarks that it may be doubted whether the natives of India were not before the Arabians in the use of mercury. Klein, in a work on the treatment of syphilis in the East, alleges that this disease was known and treated with mercury by the Malabar physicians as early as the ninth century: and Captain Sykes states that the Hindoos claim to have induced salivation by the inhalation of mercurial vapor from time immemorial.

The employment of mercury in Europe was borrowed from the Moors in Spain, and from the Saracens during the Crusades: but as yet it was only applied externally in the form of inunction or fumigation. In the thirteenth century its effects were described by Theodoric, a friar, and afterwards Bishop of Cervia, and in the following, century, its operation upon the mouth was mentioned by Guy de Chau-After the development of syphilis, in the fifteenth century, the virtues of the medicine became more generally known. Freind states that it was first recommended by Johannes de Vigo for confirmed syphilis. According to Astruc, the internal as well as the external use of mercury for this disease was proposed by Clowes, an English surgeon, who wrote in 1535, but the innovation is also attributed by Alston to Paracelsus, who died A.D. 1541. It is probable that neither of these statements is strictly accurate, for in 1540, the pills of Barbarossa, a native of Mitylene, and a famous corsair, became celebrated from their having cured Francis I. of syphilis. Barbarossa, who had obtained the receipt for these pills from a Jewish mountebank, sold it to the French monarch. According to various accounts they contained, besides mercury, musk, flour, rhubarb, turpentine, &c. is, however, certain that the introduction of mercurials as internal medicines is chiefly to be attributed to Paracelsus and his followers. Matthiolus, who was nearly contemporary with him, speaks of their

Gradually the employment of mercury in other diseases than syphilis was introduced. Zacutus Lusitanus (Ob. 1642) used it in a great variety of affections; Fabricius von Hilden wrote of its employment in gout and rheumatism, but not favorably. Van Helmont first published its anthelmintic virtues, and Bertini prescribed it in exanthematous fevers and in inflammations. Belloste, who styled it "one of nature's miracles, and a most rare gift of Providence," published an account of its remarkable effects in secondary syphilis, scrofula, and indurations. The preparation of calomel was long a secret, but one of the methods of procuring it was made known by Béguin in 1608.

being used internally as antisyphilitic remedies. In 1667, corrosive

sublimate was first used internally. Still the method by inunction

continued to be regarded with preference, as the practice of Wiseman

Sydenham, Astruc, and even Hunter, sufficiently proves.*

¹ Materia Indica, i. 545.

Rosknbaum, Geschichte der Lustseuche, p. 67.

³ Lond. Med. and Phys. Jour., March, 1827.

⁴ Freind, Hist. of Physic, ii. 361.

6 Alston, Mat. Med., i. 83.

⁶ Voigtel, Arzneimittellehre, ii. 277. Richter, op. cit. v. 300.

⁷ Comment., lib. v. cap. lxx.

LANE, Lect. on Syphilis, Lancet, 1841-42, i. 286.

Traité du Mercure, 1695.

jected into the veins it is carried to the right side of the heart and into the lungs, where it occasions the formation of small abscesses, each one of which contains within it a globule of mercury, and is surrounded by a portion of hepatized lung tissue. In none of such experiments does the mercury appear to reach the left side of the heart. Mr. Ancell quotes an experiment in which metallic mercury was thrown into the jugular vein of a dog. Within twenty-four hours, great difficulty of breathing ensued, and death on the fourth day. The pulmonary pleura was raised in many places in the form of blisters, containing bloody pus, and globules of mercury. Magendie's experiments are to the same effect. When injected into the arteries, in like manner, it does not visibly proceed further than the capillary network of these vessels. It there, however, as in the lungs, deranges the functions of the part, and excites suppurative inflammation. It is said that in the neighborhood of the furnaces for roasting mercurial ores in Idria, cows are salivated, grow cachectic, and abort; their calves also are feeble. In fish-ponds supplied by the waters of streams into which the hot slag is thrown, the trout lose their mottled color.

On Man.—Wibmer has collected a number of cases in which metallic mercury was taken without serious harm, in doses of from several ounces to two pounds. In one case, however, ascribed to Albano, death is attributed to the effects of the medicine; and in others more or less salivation ensued. At one time in England crude mercury was taken by ladies to beautify the complexion, and the name of Dr. Dover is familiarly associated with this extravagant custom. Bradley gives the history of an old gentleman who daily, for nine months, took an ounce of quicksilver, without its doing him either good or harm; and out of sixteen pounds he had thus taken, all but an ounce and a half was recovered from the fæces. In the greater number of cases, as in this one, the mercury appears to have been voided, without doing any injury to the patient; but sometimes, besides causing the rupture of a diseased bowel, it occasioned sali-Two such cases are related by Mead, and one of them proved fatal.3

Considering that the phenomena of mercurialism are so familiar to every medical observer, it seems almost incredible that a doubt should have been entertained at any time of the absorption of mercury into the system. Yet the influence of a medical theory availed to discredit so evident a truth. In this country, we find that one of the few contributions of Dr. Physick to medical literature is an experimental essay to prove that mercury is not absorbed, because with his reagents he was unable to find traces of it in the blood or saliva of persons who had been treated by it. He was disposed to believe that mercury acted "sympathetically." Yet numerous cases were then on record proving the sensible presence of mercury in the dead bodies of persons who, in their lifetime, had used preparations of this medicine. Even in 1767, Barry described the circulation of mercurial

¹ Lancet, June, 1840, p. 443.

³ Medical Works, p. 76.

² Sigmond, Mercury, Blue Pill, &c., p. 16.

⁴ Med. Repository, v. 288.

when once fully developed. The affection just described, although a striking illustration of the absorption of mercury by the system is not, in reality, a more conclusive proof of this operation than the more customary effects of the medicine which will next be considered, or those other forms of mercurial cachexia which will afterwards be described.

Effects of Medicinal Doses.—When blue mass, calomel, or either of the mild mercurial preparations, is taken in small but repeated doses, with a view of affecting the system, peculiar phenomena are developed. The first appreciable effect is usually an increased activity of the secretions, particularly of the intestinal canal, the discharges from which become liquid and bilious. The mucous membrane of the respiratory apparatus, and sometimes, also, of the genito-urinary organs, displays a similarly augmented secretion. If there happen to be anywhere an interstitial deposit of fibrin, or a collection of serum, its absorption is promoted. If the administration of the medicine is persisted in after the occurrence of these symptoms, others are developed of a more decidedly morbid character. The appetite fails, digestion is impaired, the secretions become still thinner and more copious, the firmness of the tissues diminishes, newly-formed callus is dissolved, and recentlyhealed wounds open afresh; the muscles waste, the skin has an earthy paleness, the eyelids and ankles become cedematous, and even general dropsy may ensue. These symptoms appear to depend upon the radical change which the blood has undergone by losing a large proportion of its normal solid constituents, and, perhaps, a portion of that vitality on which its coagulability in part depends. The unwonted fluidity of the blood predisposes to hemorrhage, which may become dangerous. Serious results from this cause are, it is true, of rare occurrence, yet one case is mentioned by Trousseau in which a man, who had been leeched and soon afterwards was salivated, experienced dangerous hemorrhage from the reopening of the leech-bites.2 Not only do the secretions, as already stated, become thinner, but they also acquire new qualities; the breath is fetid, a peculiar metallic taste is perceived in the mouth, the saliva, as elsewhere shown, contains mercury, and traces of this substance exist also in the milk, and, in that case, is very apt to derange the digestion of healthy children.3 This mercurialization of the milk has been used therapeutically in cases of infantile syphilis.

Of all the usual effects of the full mercurial operation, salivation is the most striking. Immediately preceding it there is often an erethism of the system, in which, besides the increase of the secretions already noticed, or even before this takes place, the patient experiences loss of appetite, has a quick and frequent pulse, and manifests unwonted nervous excitability. If the salivation is profuse, this state may become strongly marked. The first evidence that the system is becoming mercurialized is shown by a metallic or copperish taste in

³ Richter, op. cit., v. 314.

² Traité de Thérapeutique, 5ème éd., i. 192.

An interesting case of the disease treated by Sandras, with sulphurous baths and iron internally, is reported, Abeille Méd., x. 131. Others were treated by Dr. Barlow, Times and Gaz., Dec. 1853; and by Dr. Goolden, Lancet, Sept. 1853, p. 231.

It has been made a question whether mercurial salivation is not dependent upon the irritation of the gums and mucous membrane of the mouth. No doubt salivation usually follows various irritations of this membrane, such as arise from detention, decayed teeth, and variolous pustules within the cavity of the mouth. It is, perhaps, also true that a portion of the quickening influence of mercury upon the secretion of the liver and the pancreas may be due to its mechanical irritation of the stomach and duodenum. But that salivation is not necessarily dependent on any such reflected irritation is proved by the fact that medicines which do not affect the mouth sometimes occasion salivation, such, for example, as iodine, iodide of potassium, tartar emetic, arsenic, nitric acid, digitalis, and the preparations of Indeed, mercury itself occasionally salivates without previously causing inflammation of the mouth. And when to this consideration it is added that mercury can be obtained from the saliva, bile, and pancreatic juice of persons or animals that have been salivated, no doubt can be entertained that salivation is due, almost, if not quite, exclusively, to the direct operation of the metal conveyed by the blood of these glands, or that the blood itself is so changed by its action as to produce the unwonted secretion referred to.

Besides salivation other evidences of the constitutional action of mercury call for notice. Some of these are usual, and, so to speak, normal effects, while others are more or less uncommon. Among the former it is desirable to note the following: The digestive apparatus is affected; the appetite is generally impaired; the tongue is coated; there is nausea with oppression, and sometimes pain or tenderness at the epigastrium; the bowels are lase, and occasionally the stools contain blood. These symptoms may follow mercurial inunction, as well as the internal use of mercury. Indeed, Oesterlen found metallic mercury in the intestine of a person who had used the medicine only

by inunction.1

The pancreas would appear, in an especial manner, to be affected by mercury. Dieterich attributed the diarrhoea which it usually causes to an excessive secretion of this organ. Dr. Copland relates the case of a female who was excessively salivated for syphilis, after which she experienced deep-seated pain and heat at the epigastrium, with nausea, inappetence, thirst, and fever, and voided thin stools containing a fluid resembling saliva. After her death the pancreas, which weighed eight ounces, was red and congested, and its duct dilated.

The power of mercury to increase the discharge of bile was for a long time unquestioned, although the mode in which it operates upon the liver was subject to discussion. According to some it renders the bile more liquid, and thus facilitates its secretion, and according to others it directly stimulates the secernent apparatus of the liver. It is not certain that it does either. As in the case of other organic stimulants, it sometimes may even cause the affection for which it is generally held to be the most certain cure. Thus Chapman regarded it

¹ CLARUS, Arzneimittellehre, p. 806.

² Am. Jour. of Med. Sci., April, 1846, p. 468.

adults are more so than children. All diseases or stages of disease in which the powers of life are greatly prostrated, lessen or prevent this action of the medicine. This is strikingly illustrated in malignant cholera. In that affection mercurials given during the stage of collapse appear to remain in the prime viæ wholly unchanged, and sometimes, when reaction has taken place, alarming and even fatal mercurialism has ensued. In typhus and typhoid fever of a grave type, in typhoid forms of disease, generally, in meningeal affections and in apoplexy, it is difficult to establish mercurialism. A very common, but mischievous error, is to suppose that the revival of the functions from their state of embarrassment and oppression is due to the salivation which occurs at the same time. Much more frequently the course of the disease, in liberating the system from its lethargy of function, permits the absorption of the medicine and the development of its specific effects, which then become superfluous, if not actually hurtful.

The more unusual and strictly morbid effects of mercury, or such, at least, as are the most important, will next be considered. And here it may be repeated that of the several modes by which mercury is made to enter the body, inhalation most speedily produces the specific influence of the medicine, and next in order, inunction is most prompt in its effects; but the stomach is the most appropriate channel of introduction for the dry and liquid mercurial preparations.

1. Mercurial Fever.—This febrile condition usually arises between the fifteenth and the twentieth days of the treatment by inunction, and commonly precedes salivation, and the specific eruption on the skin. It has the characters of an irritative oftener than of a continued fever. There is a complaint of weariness and chilliness; the pulse is frequent, the tongue coated, the tendency to perspire very great, and sometimes the sensibility of the skin is such that the patient is readily chilled, and may even perish from nervous apoplexy. Simultaneously with these symptoms there is usually an intolerable sense of constriction in the stomach, nausea, sometimes vomiting, but not frequently, colic, and either diarrhoea or constipation. The duration of this fever is generally from three to seven days, but it may last for several weeks. It terminates on the occurrence of salivation, by the specific rash, presently to be described, or by sweating.

2. Morbid Action on the Skin. Eczema Mercuriale.—The continued use of mercurial frictions irritates the skin, inducing at first redness and tenderness, and afterwards, in some cases, a peculiar eruption, erysipelas, or even fatal gangrene. The cutaneous eruption excited by mercury was first, it is believed, mentioned by Benjamin Bell, who says: "It is not an uncommon effect of mercury to excite an eruption upon the surface of the body. In some this appears as a miliary rash, somewhat resembling measles; while, in others, it is considerably elevated, and seems to be produced by a serous effusion between the cutis and the scarf skin. In some the eruption is partial, while in others, it prevails generally over the whole body." It was

¹ Canstatt, Med. Klinik, 2te Aufl., ii. 794.

of a child, eleven years of age, who, for an inflammation of the trachea, took eight grains of calomel in divided doses. Salivation followed, with excessive swelling of the face and neck; ulcers beginning at the corners of the mouth spread to the lips and cheeks, causing an extensive destruction of both; a sloughing ulcer formed on the palate, and the fetor of the breath was excessive. Treatment was unavailing, and death took place on the eighth day. That form of ulceration of the mouth known as gangrænopsis usually arises during a state of exhaustion of the system following disease, especially eruptive fevers and dysentery; the ulcers are of a circumscribed character, generally of the cheek, and follow tumefaction and hardness of the part. The affection known as cancrum oris, and proceeding from the same causes as the one last mentioned, begins in the gums, and presents symptoms closely resembling mercurial sore mouth, including salivation, swelling of the submaxillary glands, swollen, spongy, bleeding, and ulcerated gums, covered with a pultaceous deposit, with loosening and even loss of the teeth. If such a state ensues upon the administration of mercury, there appears to be nothing by which it can be distinguished from the effects of this medicine, unless it be the existence of a fetid odor, which is different from that occasioned by mercury.

4. Salivation.—The principal morbid phenomena of this process have already been described.

- 5. Mercurial Purging.—This is not the direct effect of purgative doses of mercury, but is an affection in which, during the constitutional operation of the medicine, the alvine evacuations become at first feculent, thin, and greenish, and afterwards watery or frothy, and pale in color. There may be ten or fifteen of such stools in the course of twenty-four hours. At the same time there is a sense of fulness in the abdomen, tenderness on pressure in the epigastrium, and a dull, tensive pain in the same region. The thirst is great, the mouth and skin dry, and the urine scanty. As the diarrhœa augments, vomiting may be superadded, while the skin grows cool and the eyes are sunken and dark. The affection may terminate in gastric inflammation. Its symptoms are by some attributed to an excessive action of the pancreas, which, as elsewhere stated, is sometimes diseased.*
- 6. Affections of the Bones.—It has long been a question, and is one not yet fully determined, how far mercury may operate to produce disease of the bones. The tendency of syphilis to develop these affections is well known, and also the great frequency of their occurrence in syphilitic cases treated by mercury, yet it is certain that they sometimes follow the administration of this medicine in cases wholly free from a syphilitic taint. Mercurial nodes, it is said, precede the ulcers, and the destruction of tissue proceeds from without inwards. They most frequently are seated in the spongy bones of the base of the cranium, or in the ends of the long bones. (Canstatt.)

Mr. Spence reports the case of an old woman who had never been affected with syphilis, but had taken large quantities of mercury.

be employed, or a solution of gallic acid. A more efficient application is hydrochloric acid applied with a camel's hair brush to the ulcerated surfaces, and immediately removed by washing the mouth with water in order to save the teeth from harm. Iodine in solution, creasote, alum, and nitrate of silver have been used in the same way. Internally acetate of lead and opium, iodide of potassium, and chlorate of potassa have been given, and of these the last is the most efficacious in this manner as well as locally.

ACTION OF CALOMEL. On Animals.—Its operation on animals does not differ from its action upon man. In large doses it occasions some depression and debility with copious purging. Some further details

are given below.

On Man.—Ledelius saw a case in which death resulted within twenty-four hours after half an ounce of calomel had been taken. The symptoms were vomiting and purging. In another instance, a female took fourteen drachms of calomel at a dose. Cholera morbus ensued, but subsided under the use of oily and mucilaginous liquids. days afterwards salivation occurred, but by the end of three weeks the effects of the medicine had ceased. Besides these, enough fatal cases are on record to prove that this preparation of mercury sometimes acts as an irritant poison. Many also demonstrate the peculiar

virulence of salivation induced by its means.

The variable effects which are produced by calomel are explained by the variable quantity of alkaline chlorides existing in the stomach, upon which the solubility and absorption of the medicine are supposed to depend. However the fact may be explained, it is fully established that both of the poisonous effects described occasionally result from doses of calomel which ordinarily are innocuous. Sometimes this peculiarity appears to arise from the action upon the calomel of common salt (chloride of sodium), taken with the food, and here, doubtless, the long continuance of the compound in the bowels would tend to develop its poisonous qualities. Hence, probably, the ordinary caution against using salt with the food after mercury, and the usual prescription of a laxative to be taken a few hours after calomel, when the constitutional action of the latter is not desired. Sometimes the muriate of ammonia appears to have been the agent in converting the medicine into a poison. A case is recorded in which a child was killed by taking several powders which contained this salt mixed with calomel.² Some further remarks upon this subject will be found below.

Chota Ram, a delicate lad of fourteen, affected with malarial fever, took three grains of calomel with eight of colocynth, and the next morning a drachm of compound jalap powder, by which he was freely purged. Two days afterwards the same doses were repeated; and, after a similar interval, the patient was attacked with all the symptoms of mercurial sore mouth, except salivation; these were followed by ulceration, gangrene, and death fifteen days after the first dose of mercury was administered.

* CAMPBELL, Lond. Med. Gaz., xviii. 484.

² Jour. de Pharm., Feb. 1840. WIBMER, op. cit., iii. 72

it appears to be hypothetical, and the remainder untrue. The latter term applies to the results of Ainslie's experiments, which have been completely set aside by the more thorough investigations of Mr. Murray, in 1841. He found that calomel, given to dogs in doses of from five to thirty grains, and thence to 120 or 180 grains, produces increased gastro-intestinal vascularity, and the larger doses sanguineous effusion. At the same time, however, an increased flow of bile, mucus, and serum takes place. But the experiments of Dr. George Scott upon dogs throw considerable doubt upon the generally received opinion, that calomel in large and purgative doses increases the flow of bile. He found a diminution in the amount of fluid bile and bile solids secreted after the administration of large doses of calomel. Mosler also, from his careful and ingenious investigations, in which repeated small doses of calomel were administered to dogs,3 concluded that the medicine does not augment the secretion of bile. The most careful analysis of this secretion, moreover, did not reveal a trace of the presence of mercury in the animals that were taking it and visibly suffering from its toxical operation.

. Most of what has been done to throw light upon this subject must be dated from the experiments just referred to, and from the observations of Dr. Inman, of Liverpool. After having shown that the extremely fetid smell of certain fæces is due, not to their "vitiation," but to their rapid putrefaction, in certain states of the economy, he, and Dr. Thudicum's after him, have shown that calomel generally diminishes the quantity of bile secreted, especially when it acts as a purgative. It turns out that the green color of "calomel stools," which is generally attributed to bile, is really owing to the presence of subsulphide of mercury, and that they contain less instead of more than the usual proportion of biliary matter. It is to the mercurial salt and not to bile that scalding of the anus is due after purgation by calomel. It appears, farther, that the brown color of fæces contained in the colon is not owing to bile, because such fæces actually yield on analysis less bile than those taken from the small intestine, which, nevertheless, are of a very light color. Moreover, although a suspended secretion of bile is generally accompanied with colorless stools, such is not invariably the case, for Dr. Inman refers to several cases of total suppression of bile in which the stools were brown. He concludes from these and other considerations that the characteristic color of fæces is owing not to bile, but to a secretion which takes place in the colon.

Calomel, even in small doses, will sometimes occasion symptoms resembling those already ascribed to the prolonged and toxical action of the medicine. It has been described as a state of morbid sensibility; a hysteric feeling which, with the shedding of tears, the yawning, and the sensation of cold that accompanies it, is singularly distressing.

VIRCHOW'S Archiv, xiii. 41.
 RANKING'S Abs. (Am. ed.), xxx. 264.
 Lancet, Oct. 1860, p. 411.

BEAITHWAITE'S Retros. (Am. ed.), xliii. 59; xlv. 86.

occur at all at the temperature of the body.¹ In addition to all of the considerations growing out of these facts, it should not be forgotten that of the three preparations of mercury especially referred to in this paragraph, corrosive sublimate is that one precisely which is least apt to produce salivation. It is stated by Mr. Clay, of Manchester, that after a long and very extensive experience of its use, both in adults and children, he "scarcely, if ever, saw a decided case of ptyalism from the exhibition of the bichloride alone."

ACTION OF CORROSIVE SUBLIMATE. On Plants and Animals.— Bouchardat found that plants are poisoned by solutions containing a thousandth part of the bichloride of mercury, and that leeches and fish are immediately affected and die in a few minutes when immersed in such a solution. He dissolved one-sixth of a grain of the iodide of mercury in a quart (1000 grammes) of water, and placed in it four small fish. Within two hours two of them died, and the others also perished by the close of the day. Yet the proportion of the salt was so small that it could not be detected by the usual chemical reagents.

A solution of the former salt injected into the veins of a dog produces signs of extreme suffering, followed speedily by death. When introduced freely into the cellular tissue of the thigh, the animal was affected with dulness, loss of appetite, and sometimes vomiting or bloody diarrhea, with general depression and ultimately death. Congestion and even inflammation of the gastro-intestinal mucous membrane were frequently, although not always, found on dissection, and there was generally fluidity of the blood. When a smaller quantity of the salt is used, symptoms of the same nature, but of less severity, occur, with salivation and intense thirst. After death, besides the lesions mentioned, the lungs and other vascular organs are deeply congested, and are sometimes the seat of a bloody extravasation.

When introduced into the stomach of dogs, corrosive sublimate occasions pain, thirst, violent straining, and vomiting of mucous and bloody matters. If the dose has been large, death takes place speedily, and in most cases with convulsions; under opposite circumstances, the animal perishes gradually by exhaustion. The resulting lesions depend upon the quantity of the poison employed, and the duration of life after it has been administered, and hence may vary from a trifling vascular injection to a state of softening of the gastric mucous membrane. These alterations may also, to some extent, involve the intestine, and the rectum in particular. Many years ago, Brodie inferred from his experiments that corrosive sublimate, when taken internally in large quantities, occasions death by acting chemically on the mucous membrane of the stomach so as to destroy its texture. Orfila came to a like conclusion, adding, however, that the poison acts upon the heart.º These conclusions are accepted almost universally as true; yet it is proper to state that Giacomini declares he never saw, in his experiments upon rabbits and dogs, the mucous membrane of the stomach inflamed or ulcerated by this substance; but, on the

OESTERLEN, Heilmittellehre, p. 102.

Annuaire de Thérap., 1846, p. 266.

Physiological Researches, p. 102.

² Lancet, Aug. 1841, p. 752.

WIBMER, op. cit.

⁶ Toxicologie, i. 677.

constriction, and a severe burning pain in the fauces, œsophagus, and stomach, with retching and the vomiting first of mucus and then of bile and blood. The pain diffuses itself throughout the abdomen, which is very sensitive to pressure, and sometimes bloody stools are voided, with tenesmus. At the same time there is great restlessness, an injected countenance, and intense thirst, and subsequently a quick, frequent, and small pulse, with labored breathing, cold sweating, a clammy skin, and suppression or scantiness of urine. In fatal cases death may occur within a few hours after the ingestion of the poison, or may be delayed for several weeks. Should recovery take place, the stomach and bowels may still remain morbidly irritable for a long time. The lesions produced by the poison are these: The stomach is contracted, its mucous membrane, that of the œsophagus, and even of the small intestine, is generally but not always reddened in patches, or is the seat of ulcers of a dark color, and with ragged edges. A large dose sometimes converts the gastric mucous membrane into a soft, grayish pulp. The bladder contains but little urine.

ACTION OF RED OXIDE OF MERCURY. On Animals.—Ten grains of this substance were given by Hillefeld to a young rabbit. No violent symptoms ensued, but the animal was purged, seemed exhausted, and died within twenty-four hours. Vascular injection and ulcers of the stomach were found on dissection. Orfila's experiments furnished very similar results. In both instances the depressing effects of the poison were remarkable.

On Man.—In many cases the constitutional effects of mercury have been produced by the external application of this compound. Several of these are furnished by Hunter in his Treatise on the cure of Lues Venerea. In one, an ointment of red precipitate was applied to a granulating stump, in another, to an ulcer of the leg, and in a third, to a sore on the trunk resulting from a burn. Internally, this mercurial acts as an irritant, occasioning cramps and burning pain in the stomach and bowels, with vomiting and purging, cold sweats, general weakness, and death. The lesions of the gastro-intestinal mucous membrane are inflammation and even corrosion.

ACTION OF THE RED SULPHURET.—Applied to a wound in a dog's thigh, it proved fatal after several days, and the stomach was ulcerated. (Smith.) Orfila, however, found no effects from large doses of it administered to animals. Its vapor appears to be capable of salivating.

ACTION OF WHITE PRECIPITATE.—The operation of ammoniated mercury is analogous to that of the bichloride, but is less energetic. It would seem to have produced death by salivation in one case quoted by Taylor, and in another (occurring in a child affected with chronic gastro-intestinal disorder) the combined irritant and depressing effects of a corrosive poison.'

ACTION OF THE IODIDES OF MERCURY.—These preparations resemble corrosive sublimate in their effects, but are less powerful. The biniodide is more active than the protiodide. (Orfila.)

Gry's Hosp. Rep., 3d ser., vi. 483, where a full account of the subject is given by Dr. Taylor and Dr. Pavy.

diseases, and yet none more perfectly conceals the secret of its operation. Of the hypotheses which have been framed to explain its action, each one, no doubt, contains some portion of the truth, and, taken together, they may, perhaps, include all the material elements for the solution of the problem. But as the diseases which mercury cures are various, we may infer that its operation is complex, and in this fact discern the obstacle that hinders a more perfect discovery of its mode The theories which, at various periods, have been proposed in reference to this question, appear to have been formed from too exclusive a consideration of the operation of mercury in syphilis, in inflammations, and in gastro-hepatic affections. It was supposed by very high authorities, to cure syphilis by means of its weight, divisibility, motility, &c., these properties enabling it to penetrate the finest bloodvessels, to break up the blood-globules, and thus diminish the crasis of Others imagined that it acted chemically, neutralizing the poison of syphilis; and others still sought refuge in the use of words without knowledge, and maintained it to be now a stimulant, and now a sedative, according to the exigencies of the case. It would be a profitless task to follow the advocates of these and other hypotheses, in their wide circuit of reasoning and illustration, and we shall here endeavor merely to express summarily the conclusions to which it is believed the considerations already set forth conduct.

It is certain that mercury, in all its modes of administration, is absorbed; that, like all other substances foreign to the organism, it acts as an irritant; and that it tends to impair the normal energy of all the nutritive operations, on the one hand, by hindering the conversion of blood into the living tissue, and on the other, by promoting the dissolution of the latter and its elimination, along with unorganized materials, with all the secretions, and especially with those of the salivary glands, the pancreas, the liver, and the intestinal follicles. By promoting absorption and secretion, it hastens destruction, as all the phenomena of mercurialism make clearly manifest. It may be questioned whether this deterioration of the solids is the cause or the effect of those changes in the blood which consist in the diminution of its fibrin and the disintegration of its red corpuscles. The latter opinion appears to be the more probable of the two. This solvent influence is most manifestly exerted upon all imperfectly organized structures, and particularly upon those which result from inflamma-Hence the aplastic power of mercury has always ranked as its most important quality. While carrying on the destructive process, it, indirectly at least, augments the excitability of the nervous system, and renders the whole organism peculiarly susceptible to external impressions, and, therefore, to the influence of the greater number of morbid causes.1

REMEDIAL EMPLOYMENT. Syphilis.—For two hundred years before the beginning of the present century it was universally believed, not only that mercury is a specific for syphilis, but also that it is essential

^{&#}x27;The mode of action of mercury has been examined by Headland, Lancet, March, 1858, p. 309; and Bernsprung, Annalen des Charité-Krankenhaus, Berlin, 1856 see Journ. f. Pharmacodynamik, i. 418.

Ricord (and in this he followed the principles of Hunter) refrained as much as possible from giving mercury during the primary affection, upon the ground that it does not prevent the occurrence, although it may postpone the development of the constitutional disease, and thus prolong the patient's anxiety in regard to its appearance. this judgment the greater number of writers on syphilis coincide. When secondary symptoms occur it is generally within six months after an indurated chancre. Now it is certain that mercurials during the primary symptoms are generally unnecessary for their cure, and may postpone, but will not prevent, the occurrence of constitutional infection. Hence it is generally unnecessary and useless to administer them for the primary disease. Although induration of the chancre is the first step towards infection of the system, of which inguinal glandular enlargements, and characteristic cutaneous eruptions are further and more complete evidences, its removal will not prevent these ulterior effects; and although simple treatment will usually heal the sore, yet its cicatrization may sometimes be hastened by mercury when the circumstances of the patient do not permit him to await a tardier cure.

There are certain contraindications to the use of mercury which ought never to be lost sight of. It should not be prescribed when the skin around the sore is very red, swollen, tense, and painful, or shows a tendency to gangrene; nor if the digestive organs are deranged, nor if any febrile or other marked constitutional disturbance exists. Such conditions should first be rectified, whether in the primary or in the consecutive forms of the disease. When, too, either form of syphilis occurs in a person affected with spanæmia, scrofula, tuberculosis, or scurvy, or in one suffering from the consequences of intemperance in alcoholic drinks, the use of mercurials demands the utmost circumspection, and is indeed generally contraindicated until a better state of health is obtained by the use of other remedies. the dyscrasia arise from syphilis itself, this condition is not a contraindication for the use of mercury. In regard to its employment during pregnancy, and especially during the latter months of this state, opinions are not uniform. Some allege that it may cause the death of the fœtus and abortion. But, on the other hand, it is maintained, and with more probability, that a moderate mercurial course, without salivation, tends to prevent or to cure the infection of the In such cases it is said that inunction is preferable to the other modes of exhibiting mercury.

The method of mercurial treatment which prevailed until comparatively recent times may be judged of from the following aphorisms of Boerhaave.²

"When pustules spread all over the body, when pains seize the joints, when there are nocturnal pains, large buboes, racking pains of the bones, repeated gonorrhoeas, it is then certain that the patient is poxed, and that a salivation is required.

¹ Annuaire de Thérap., 1848, p. 267.

² Van Swieten's Commentaries, xvii. 230.

method per extinctionem, in which all possible care was taken to prevent a salivation. So Plenck (1766) maintained that salivation, far from being attended with any advantage, constantly retards a cure, and subjects the patient to many inconveniencies. "It is," he continues, "very inconvenient and dangerous, and does not give a certain cure, is not critical, nor can it be excited in every subject, nor is it necessary in any." The observation of physicians of the nineteenth century has led to no more definite conclusion than this.

It may be inferred from the preceding statements that the rules for the administration of mercury in constitutional syphilis should all be subordinated to the fact that salivation is a morbid process, and is, therefore, to be avoided. The doses of the medicine which are required to duly affect the system will depend upon the preparation used, and upon the age, constitution and individual peculiarities of the patient. They should, at the beginning of the treatment, however, always be very small. They may afterwards be gradually and cautiously increased, to be again diminished or suspended if they produce morbid effects. The progressive increase of the dose ought generally to be interrupted whenever the symptoms begin to decline, to be again resumed, however, if the disease tends to revive. An important practical question here presents itself, and one most difficult of solution, viz., for how long a time the mercurial treatment must be continued? To this question no positive answer can be given, for it must be confessed that no term of mercurialization, however long, can infallibly secure the patient against ulterior outbreaks of syphilis. All that can be said is, that the most competent authorities agree to recommend a period of about six months, during which the system should be kept under the influence of the medicine.

Forms of Mercurial Treatment used in Syphilis.—Inunction. This, the oldest of the methods employed is not without its partisans at the present day, although it is very generally abandoned. Sir B. Brodie remarks: "It is dirty, laborious, and troublesome, and makes the case public to the family in which the patient lives, but it is much less liable to gripe and purge than mercury taken by the mouth; it cures the disease a great deal better, and does not damage the constitution half so much." But it must be properly applied, and continued until the hardness of the primary sore disappears, and for some time afterwards, or until the mouth becomes slightly affected. In secondary syphilis, it should not be desisted from until after the disappearance of all the symptoms. Before commencing the treatment the patient should live for some days upon simple food, take a laxative medicine, and cleanse the skin thoroughly by warm bathing. The frictions with mercurial ointment should generally be made in the evening, and near the fire. If possible, they should be performed by the patient himself, or, if by an attendant, he should have his hand protected by a caoutchouc glove, or by a pig's bladder previously softened with warm water. The places selected for friction should be used alternately or in succession, as for instance the thighs, the arm-

¹ Van Swieten, op. oit., xvii. 263.

² PLENCK, OH Mercury.

disease of the fauces, nares, larynx, &c., renders it desirable to apply the fumes directly to these parts.

Calomel and Blue Pill are the two forms of mercury most frequently employed in Great Britain and the United States, for internal administration. They both salivate with facility, but in this respect calomel is most objectionable, at least in doses of half a grain or a grain three times a day, united with opium to prevent its acting upon the bowels. Dany prescribed one grain of calomel with fifteen grains of sugar, divided into six parts, of which one was given every two hours. cases treated by him were seventy-two soldiers, of whom twenty-eight had primitive chancres, ten secondary syphilis, and thirty-four gonorrhœa. On the last the treatment had no effect, but it cured the others. Simple chancres healed in from twenty-five to thirty-five days, and the indurated and inflamed, in from forty-five to sixty days. secondary forms of the disease for the most part disappeared in from twenty-five to thirty-five days. In these experiments of M. Dany, which were not exactly according to Law's plan, salivation sometimes occurred. On the whole, the duration of the chancres appears to have equalled that observed in the use of a purely local treatment.

The remoter forms of syphilitic infection are sometimes, but not generally, treated by calomel. Thus Graves, in syphilitic periostitis of the cranium, recommended this preparation to be given in doses of a scruple to a drachm in the course of the day, and to be persisted in, despite of salivation, and the dose even to be increased, until the pains disappeared. It must be confessed that this plan does not commend

itself by its safety.

Iodides of Mercury. The combination of iodine with mercury was first proposed and executed by Odier, of Geneva, in 1814, but was first employed by Biett as an external remedy for syphilis in 1821, and internally in 1826.3 He thought it was recommended by its comparatively slight action upon the bowels. It has since that time continued to be the favorite antisyphilitic mercurial employed by Cullerier, Ricord, and others, especially in secondary ulcerations of the mucous membrane, cutaneous tubercles, exostoses, and chronic affections of the joints. The following is the mode of administration adopted by Ricord. The protiodide (green iodide) is made into pills of one grain each, and one of these is given daily during the first two or three days of the treatment, and then the dose is gradually increased until it reaches three, four, five, or more pills a day, or until some effect upon the symptoms is discovered. If the medicine does not derange the digestive organs or induce soreness of the mouth, it is continued at the same dose; or if such effects occur, its quantity is diminished. Ricord maintains that the efficacy of the medicine is impaired in exact proportion to the derangement of system which The appropriate dose in each case must be determined by its peculiarities. According to Ricord, the requisite duration of the treatment varies between three and six months. In persons of good

¹ Jour. de Méd. (1846), iv. 203.

² Clinical Med., p. 628.

Bull. de Thérap., i. 369.

and when the baths had been used for some time it grew harsh, the cuticle exfoliated, and the nails assumed a grayish color. In no instance was salivation excited.

Fevers.—Typhoid Fever. The advantages of a purgative treatment in this disease appear now to be well established by the concurrent testimony of physicians in various countries. It reduces the abdominal distension, calms the delirium, and allays the fever; the tongue under its influence grows soft and moist, and very probably it tends to eliminate by the bowels the poisonous cause of the symptoms. Among those who have sought to produce these effects by calomel since the diagnosis of typhoid fever has been sufficiently understood, may be mentioned Ross, Sicherer, Taufflieb, Schoenlein, Fauconnet, Lombard, Serres, Becquerel, and Canstatt. Mr. Ross, indeed, somewhat anticipated the knowledge of this diagnosis in Great Britain. an article treating of the disease under the name of typhus hecticus, he strongly recommends calomel, not as an alterative, which he considered dangerous, nor yet as a purgative, but solely "as a sedative," i. e., in doses of one or two scruples, repeated three times during the first three or four days of the attack. Administered in this way, it neither salivates, nor purges beyond procuring two or three stools. advised, however, that if it do not purge, as it sometimes does not, an aperient should be given, as, for instance, twenty-five grains of jalap with a like quantity of calomel. Mr. R. states his belief that this remedy promotes the healing of the intestinal ulcers, and he states that he employed it nearly one hundred times, and always with perfect safety to the patient. Sicherer, of Heilbronn, treated 640 cases of the disease by full doses of calomel, and lost but 19 of the number. He gave an emetic the first day; on the second, fifteen grains of calomel, producing from seven to twelve stools; and on the third day, the same dose, which occasioned four or five stools only. On the fourth day no medicine was administered, but on the fifth day a dose like the former produced from one to three stools. In this way the typhoid or nervous stage of the disease is said to have been prevented.3 Taufflieb has examined this method of treatment very thoroughly, and arrived at important conclusions. These were drawn from a comparative study of 518 cases of typhoid fever occurring during a period of fifteen years. He inferred from his observations that mercurial purges have a peculiar and, as it were, specific power of arresting the progress of the disease. The mercurial action may be primitive or secondary, purgative or sialagogue, but either is curative when established near the commencement of the attack. Out of the 518 cases, 305 were subjected to the calomel treatment before the tenth day of the disease, which was then arrested within two or three days after the administration of the medicine. Its first effect was generally to produce several brown or green, slimy stools, followed by a decided sense of relief. In 230 of the 305 cases, convalescence immediately followed the purgative operation, and in only 12 of them did saliva-

Beiträge zur Erforschung, &c., p. 103.

Bull. de Therap., xl. 119.

² Lancet, 1842-3, i. 838, 891.

was decidedly entered upon between the eighth and the fourteenth The patients remained in the hospital from thirty-five to fifty days.1 The general results here given have been confirmed by Becquerel, who employed the same preparation of mercury; but they do not appear to be as favorable as those obtained by an expectant treatment alone. It cannot be too often repeated, that typhoid fever is a disease remarkably liable to variation of type, so that the treatment which succeeds best in one year is not always the most successful in the following year. Whether there is any type of the disease, or any medical constitution, which renders mercury an eligible medicine in typhoid fever, we very much doubt in spite of the favorable statements which we have recorded. Theory and experience combine to condemn it. If the results of its use have appeared to be more favorable than those of still more perturbative methods, they are indubitably inferior to those of a prudent medicinal expectation, and a moderate and cautious use of food and stimuli.

In reference to the specific action of mercury, Dr. Nathan Smith informs us that in many instances he has seen very serious evils arise from it, and he recommends the medicine to be only occasionally used, and with opium, for the purpose of checking a colliquative diarrhœa. Dr. James Jackson concluded that mercurials have probably no great influence on the results of typhoid fever. Dr. G. B. Wood, on the other hand, entertains an opinion that mercury given so as slightly to affect the gums, is a very effectual remedy for the dryness of the skin and tongue, with scantiness of the urine, tympanitis, and stupor, which are apt to occur about the ninth day, i. e., about the height of the disease. The natural tendency to cure, of many cases of typhoid fever at this stage, is not to be lost sight of. It is the period, we are disposed to think, at which gentle diffusible stimulants and nutriment are best adapted to remove the condition referred to; the period at which that condition is beginning to be established, when the oil of turpentine, proposed by Dr. Wood, finds its earliest, though still a very slight indication.

Yellow Fever. Mercury has been exhibited in this disease in two modes, as a cathartic and as a sialagogue. For its former operation, after having been used by Chisholm and other physicians in the West Indies, calomel was adopted by Dr. Rush, of Philadelphia, who employed it more or less during the successive epidemics of yellow fever that he witnessed. During that of 1793, he prescribed it in doses of ten grains with fifteen grains of jalap, to be repeated every six hours until the medicine procured from four to six large evacuations. The effects of this combination, he remarks, "not only answered, but far exceeded my expectations." During the epidemic of 1794, he increased the dose, so that we read of one patient taking one hundred and fifty grains of calomel in six days. In the subsequent epidemics of 1797, '98, and '99, he appears to have confined the administration of calomel

² Ibid., 1851, p. 187.

¹ Annuaire de Thérap., 1848, p. 172.

³ A Practical Essay on Typhus Fever, p. 68.

Report on Typhoid Fever, 1838, p. 87.

Practice of Medicine, 4th ed., i. 345.

possible, that among these types, a marked inflammatory one may sometimes occur. Such must certainly have been the cases which endured, and apparently were cured by, the profuse depletions of Rush, Jackson, Moseley, &c. In other epidemics, and especially of late years, depletion has not been tolerated, and the symptoms of the disease have justified one of the names imposed upon it—typhus icterodes. In so far as the elements of a typhoid condition are predominant, the utility of mercurials may be, with confidence, denied; but if a sthenic inflammatory state prevail, they will undoubtedly be tolerated, and

may, perhaps, be useful.

Bilious Remittent Fever. The cholagogue action of mercury is invoked in this affection to relieve the overloaded liver, as it is in yellow fever to stimulate the non-secreting liver. Leaving unattempted here the task of reconciling these apparent contradictions, let us endeavor to learn whether or not experience has proved mercurials to be useful in bilious remittent fever. In reference to their purgative action, it may be remarked that this is generally sought for at the beginning of an attack, by the administration of ten grains of calomel at bedtime, and some saline laxative, or else jalap, on the following morning. But even at this stage such treatment is unnecessary, unless the abdomen is full and hard, the tongue much coated, and the alvine evacuations sensibly disordered. In this disease the real remedy is quinia, and it is much better to obtain its specific operation as soon as possible, feeling assured that then the associated local derangements will be all the more readily removed.

It may be presumed that the employment of calomel as a constitutional remedy in this disease, whether by the daily repetition of slightly laxative doses, or the more frequent administration of still smaller quantities, is still the general practice in some portions of the United States. So far as those forms of the disease are concerned which originate in the Middle States of the Union, we have never found it necessary to prescribe mercurials except as purgatives, relying, for the cure of the disease, upon quinia alone. It is possible that the more inflammatory form of remittent fever met with in southern latitudes may call for a different management. But the excellent reports of Dr. Boling, and several other southern physicians, render this supposition improbable. Moreover, if we turn to the East Indies, whence the calomel treatment first emanated, we shall find that it no longer holds its original place in the medical creed of that country. One of the most eminent of the East Indian practitioners, Dr. Charles Morehead, says: "The practice, at one time too common, of exhibiting calomel in doses of four or five grains three or four times in the course of the day, without any very definite object in view, and continuing it for a succession of days, cannot be too strongly discouraged. Not only is it unnecessary, but, for the following reasons, often positively injurious. In watching the progress of cases thus treated, it is not difficult to detect a train of symptoms much more

² Clinical Researches on Disease in India, i. 202, 206.

Compare Boling, On Remittent Fever, Am. Jour. of Med. Sci., July, 1846, p. 29; and Dickson, Elements of Medicine, p. 243.

antiphlogistic powers to mercury, and it is really lamentable that in France so many prejudices should be aroused against this heroic remedy." In Germany, likewise, although of more common use than in France, mercury is still employed with comparatively less frequency than in England and the United States; and, indeed, an occasional disposition is shown to banter British and American physicians for their mercurial fetichism.

It is not very easy to furnish demonstrative evidence of its antiphlogistic virtues; but in therapeutical questions the convictions of competent judges must be allowed, to some extent at least, to acquire the authority which belongs to demonstration in the exact sciences. The convictions entertained of the efficacy of mercury as a remedy for inflammation are very decided and deeply rooted. Dr. Latham thus expresses his own opinion, which may be taken as representing the general sentiment of the profession on this subject. Referring more particularly to phrenitis, peritonitis, pneumonia, and pleurisy, he concludes with these remarks: "The sum of my experience is this, that the acutest forms of these inflammations are arrested more surely and more speedily by bleeding and mercury conjointly than by bleeding alone; and not only more surely and speedily, but by a less loss of blood; in short, that mercury does not supersede bloodletting, but that it aids its antiphlogistic power, and yet spares its amount." It is, then, as an aid to the lancet when bloodletting is called for, and as a substitute for depletion when this cannot be borne, or when the proper stage for its employment has passed away, that mercury becomes useful in the treatment of sthenic inflammation.

The question how it operates in this form of disease is usually answered by a reference to its aplastic power. The great physical phenomenon of inflammation is an increase of the fibrin of the blood, and the tendency to form fibrinous effusions upon membranes, especially serous membranes, and in the parenchyma of the solid organs. Mercury cures these morbid effects of the inflammatory process, removing effusions, preventing adhesions, contractions, obstructions, &c., which tend to impair the activity and hinder the free play of the organs. We have seen how in animals and men subjected to the prolonged action of mercury the solids of the body lose their firmness and the blood its coagulability, and hence there is every reason to believe that a moderate action of the same substance will tend to remove the unorganized or imperfectly organized products of inflammation. It has been objected to this explanation that the constitutional mercurial action sometimes gives rise to the very plastic formations for which it is alleged to be an appropriate cure. And undoubtedly such is the case. Plastic exudations tend to occur whenever the proportion of fibrin in the blood is increased, whether it exceed the normal average while the proportion of red globules remains unchanged, or whether it is only relatively increased in consequence of the diminished proportion of red globules contained in the blood. Now, it is highly probable, judging from the pallid,

I Thérapeutique, 5ème éd., i. 223.

NEUMANN, Heilmittellehre, p. 285.

the only medicine which appears to be materially useful in their management. Two of the earliest cases of the successful treatment of such affections by mercury were recorded by Dr. Leib, of Philadelphia, in 1788,1 and another, in which the affection was of a less acute type, was soon afterwards cured by Dr. Rush.2 A very similar instance occurred under the care of Dr. Chambers, of London, who has rendered it probable that even meningitis produced by tubercles may be cured by mercurial medicines.3 But whenever a febrile affection, apparently of cerebral origin, is marked by convulsions in the forming stage, by severe pain in the head, by morbid susceptibility of the senses, and injection of the face and eyes, there is reason to suppose that simple meningitis exists. In cases of this description, mercury is generally employed both as a purgative and for the purpose of producing its constitutional effects. With these objects in view, a full dose of calomel, followed by a saline or other purge fitted to produce copious stools, should be administered; subsequently divided doses of calomel should be given, and at the same time mercurial ointment rubbed into the thighs. Gölis, who has written very clearly upon this disease,4 depended chiefly for its treatment upon calomel, given to children of from one to five months old in doses of one-quarter of a grain, and to those of from six months to two years of age, in doses of one grain every two hours, until it produced from four to six greenish, slimy stools. This treatment is not less appropriate to the disease when it Mercurial purges may be used with great advanoccurs in adults. tage in the first stage; and subsequently, when the excitement has declined, and there is a tendency rather to oppression of the faculties and coma, fractional doses of calomel should be administered, so as to produce, if possible, the characteristic effects of the medicine upon the gums.

Pericarditis. "If," says Graves, "a person is seized with very acute pericarditis, how unavailing will be our best directed efforts unless they be succeeded by a speedy mercurialization of the system," and Dr. Stokes subscribes to this doctrine, advocating the exhibition of twenty grain doses of calomel, once or twice daily. On the other hand, Dr. Markham, one of the most intelligent writers on diseases of the heart, concludes from his experience that "the actual influence which the remedy possesses over the disease has yet to be shown." While to Dr. Fuller "it is obvious that no case of pericarditis occurring in a strong and healthy person, can be safely treated without mercury." Dr. Walshe thinks "it must be conceded that any precise evidence before the profession fails to demonstrate the alleged prowess of the mineral." To the latter of these judgments we adhere. There can be no doubt that acute, primary, and idiopathic pericarditis tends generally to cure without the intervention of any active remedies,

¹ Trans. Coll. Phys. of Phil., 1793, p. 49.

^{*} Lancet, April, 1858, p. 386.

⁴ A Treatise on Hydrocephalus Acutus, Trans. by Gooch, p. 110.

Diseases of the Heart and Aorta, p. 86. Diseases of the Heart, p. 98.

<sup>Diseases of the Chest (1862), p. 535.
Disease of the Heart, &c. (1862), p. 236.</sup>

of their curative powers are not extravagant, we may place them in the first rank of those few remedies upon which some dependence is to be placed. The probability is that the cases of puerperal peritonitis adapted to the use of mercurials are the same that can bear depletion, while those which more properly belong to the category of puerperal fever, and which involve a greater or less diminution of the coagulability of the blood, are with still more certainty unfit either for de-

pletion or mercurialization.

Rheumatism. Of all the remedies which can be used in acute rheumatism, none is entitled to less confidence than this. , It exerts no control over the disease itself, and if pushed to the extent of making the mouth sore, is apt to occasion great debility and exhaustion. does not prevent the occurrence of the serous inflammations which often complicate rheumatism, but it does, by prematurely occupying the ground, deprive the physician of a resource against these inflammations when they are actually developed. Yet it is proper to state that Hamilton, Hope, and J. Johnson, advocated the mercurial practice in this disease, while Dr. Copland's opinion resembles that which we have above expressed. In the subacute and chronic forms of the affection a very gentle and sustained mercurial action will sometimes put an end to the lingering stiffness of the joints, the persistent thickening of the ligaments, the periosteal swellings, and the muscular and neuralgic pains which become particularly severe during damp weather. this purpose very minute doses of the bichloride, in syrup of sarsaparilla, will be found most appropriate.

Inflammations of the Parenchymatous Organs.—Pneumonia. Since it has been ascertained that in the great majority of cases simple acute pneumonia does not require active treatment, the use of mercurials in this affection has greatly diminished. Dr. Walshe says: "Mercurials appear to me to be desirable in those cases of pneumonia only where, for some cause or other, antimony is inadmissible;" and Grisolle, in his classical work on this disease, describes its treatment by calomel and opium as a method employed by English physicians, but adds that he has never seen it used, or resorted to it himself, and, indeed, would not venture to employ it.2 In France, generally, and also in Germany, mercury is seldom used in the cure of pneumonia except as a purgative. Among English and American physicians it is more commonly employed, but of late less extensively than in former times. It is possible that mercury may display in cases of rapid and general hepatization a virtue which it does not in the ordinary forms of the But we cannot forget that such cases precisely we have known to get well with resolution without any medicine at all. Dr. West recommends it in those cases among children where the symptoms are not violent enough to require very large doses of antimony, or where the stage for administering this medicine advantageously has passed by. In graver cases, attended with bronchial respiration he advises it in addition to depletion and tartar emetic. Dr. J. F. Meigs

Diseases of the Lungs, &c., 2d ed., p. 436.

^{*} Traité Pratique de la Pneumonie, p. 678.

Diseases of Infants, &c., p. 270.

stitutions the means recommended are no longer applicable; among the objections to them is their tendency to excite dysentery, and, as a further consequence, abscess of the liver. The caution required in the administration of mercury with a view to its constitutional action in hepatitis is shown by all experience to be very great, at least in warm climates. The repeated use of this medicine is known to induce a permanent derangement of the hepatic function, with disordered digestion and impaired general health, and, in the opinion of many, promotes the development of hepatic abscess; hence it appears now to be established as a rule of practice to administer no more of it than is necessary to produce slight ptyalism, during the early stages of the disease alone, and provided that depletion and purgation have failed to subdue the symptoms. If abscess of the liver should occur, or seem to be threatening, the further use of mercury in any form is contraindicated. When abscess already exists, most writers agree that it is a matter of great difficulty to bring the system under the mercurial influence.

Chronic Hepatitis. In this affection, when the liver is enlarged, tender upon pressure, sometimes indurated, and its secretion scanty, it is usual to administer mercury both as a purgative and for its constitutional effects. But such treatment will only aggravate the disease, unless it be purely of inflammatory origin. Supposing this to be determined, great circumspection must be observed in the use of the remedy, and, if persisted in, other appropriate means should be conjoined with it to sustain the strength and give activity to the functions of the skin, intestine, and kidneys.

Chronic Functional Derangements of the Liver, attended with "a muddy or yellowish cast of countenance, a heavy expression of the eye, and a dirty yellow tinge of the tunica albuginea, pale or dark and offensive stools, epigastric oppression and fulness, loss of flesh and strength, a feeble pulse, and depressed spirits," were treated by Annesley and by his numerous imitators with calomel at night and a purgative draught in the morning until the stools assumed a healthy appearance, when blue pill at night and a laxative in the morning were substituted for the stronger medicines, to be in their turn followed by tonics. So far as the symptoms above detailed denote functional disorder of the liver, it may be asked whether the repeated administration of mercurial purges was necessary for their removal? Their treatment by these agents is almost exclusively confined to British physicians and their imitators in this country, with too many of whom derangement of the liver, whether by excess or deficiency of secretion, is habitually treated with mercury, as if this medicine were endowed with a special power of righting all the wrongs that can afflict the biliary organs. This irrational system has been reprobated in terms of just severity by several writers, among whom Saunders, Abercrombie, Holland, and Thomson may be mentioned. Even Mr. Twining pointed out the absurdity, in cases of jaundice supposed to depend upon obstruction of the common duct of the liver, of giving

WARING, On Abscess in the Liver, Trevandrum, 1854, p. 200.

Jaundice. It is to be supposed, in the present state of our know-ledge, that jaundice depends either upon some impediment to the flow of bile into the duodenum, or to its defective secretion. Over the latter, mercury is not proved to exert a favorable influence. The former condition, in so far as the obstacle is purely mechanical, such as a gall-stone, a tumor, closure of the duct, or the like, is equally beyond the power of this medicine, but where it is produced by a congested state of the liver, and the object is to unload the portal circulation, depletion and saline purgatives are preferable to calomel. But if, in spite of these remedies, the symptoms are not wholly removed, mercurial purges should be added to the treatment, and small doses of blue pill with aloes or rhubarb, given so as very gently to maintain an action upon the bowels.

Chronic Enlargement of the Spleen. Twining noticed that patients who are suffering from this affection are generally liable to be affected in the most unfavorable manner by mercury; the immediate effects being profuse salivation and destruction of the soft tissues of the mouth followed by caries, and the remoter consequences being permanently injured health, or a broken and ruined constitution.1 singular susceptibility renders the duty imperative to abstain from the administration of mercury in cases of hepatic disease complicated with enlargement of the spleen. The same evil influence had been noticed by earlier observers. Dr. Crane, who practised in the fens of Lincolnshire, says: "Mercury does not appear to be at all beneficial in enlargement of the spleen."2 Dr. Vetch, also, speaking of this affection, remarks that any continued course of mercury renders the patient less capable of regaining that general tone of the system, the want of which forms the principal obstacle to his recovery.3 Leue, of Berlin, called attention to this peculiarity in 1825; and, just before, Abercrombie remarked that attempts to reduce chronic enlargements of the spleen by mercury are generally followed by the worst consequences.4 Mr. Henderson, in his observations on the diseases of natives of Hindostan, says that in enlargement of the spleen, mercury easily produces ptyalism to an alarming extent, and so readily that gangrene and death have been the result of a few doses of blue pill. Finally, Mr. Martin remarks that mercurial remedies in enlargement of the spleen and its coexisting cachexia, are distinctly and grievously injurious, and that they should never be used. This cachectic and anæmic condition of the system should be treated by tonics, and particularly cinchona and iron.

A curious statement has been made respecting the virtues of biniodide of mercury in goitre. It appears that this affection is extremely prevalent in Bengal, and not less than 60,000 persons are said to have been treated according to the method of Captain Cunningham, with scarcely a case of ill success. An ointment prepared with three

Diseases of Bengal, i. 452.

⁸ Edinb. Med. and Surg. Jour., April, 1823, p. 245.

Lond. Med. and Phys. Jour., li. 445.

⁴ Edinb. Med. and Surg. Jour., April, 1824, p. 9.

⁵ Ibid., July, 1825, p. 34. Op. cit., i. 71

Inflammation of the Mucous Membranes.—Whether or not it be owing to the belief, so generally entertained, that the antiphlogistic powers of mercury depend upon its aplastic operation, and hence that it is inappropriate to the cure of all inflammations which do not tend to fibrinous effusion, the fact is that in practice it is seldom employed, except as a purge, in inflammations of the mucous membrane which are not of the pseudomembranous form. To these the following re-

marks will be chiefly applied.

Croup, or Pseudomembranous Laryngitis. According to Cadwalader Colden, "dulcified mercury" was used as early as 1736, by Dr. Douglas, of Boston, in a "throat distemper," which, from the description, appears to have been pseudomembranous inflammation of the pharynx and larynx. But this physician does not seem to have attached much importance to it in comparison with gentle diaphoretics. Dr. Bard, of New York, was the first to use calomel in croup, during an epidemic of the disease in 1771. Currie states that it was employed by Dr. Thomas Bond, and several other American physicians, as early as the year 1772, in the malignant sore throat.2 A few years afterwards (1781), Dr. Bayley, of New York, used it with advantage in the same disease, although he depended more upon bloodletting and emetics. Currie, who wrote in 1811, remarks that he conceives the mercury to act by causing the false membrane to be detached, so that it is more readily expelled by coughing, or by means of emetics, which he recommends to be given for this purpose. And thus, in a few words, he expressed, as we believe, the whole doctrine of the utility of mercurials in croup. The remedy was also strongly recommended by Kuhn, Redman, Stearns, Hosack, and Physick. From America the use of the remedy speedily extended to England, where it was particularly advised by Hamilton and Cheyne, and to the continent of Europe, where it sustains its reputation even to the present time. Germany its value was recognized by Albers, Goelis, Schenck, Huseland¹⁰, Autenreith, &c., and in France, by Bretonneau,¹¹ Billard, and, more recently by Guersant.¹² Too generally the real indication for the use of this medicine in croup has been lost sight of, and it has been applied when the advanced stage of the disease has rendered it, at the least, unavailing. Even at the present day this method, which we believe erroneous, is the one generally recommended. Canstatt¹³ refers to mercury as a remedy of only doubtful efficacy, and prescribes it after the failure of other means; and Dr. West remarks, it is "after the severity of the disease has been subdued by antimony, that the time has come for the administration of calomel." It is true that he

4 Essays, ii. 159.

⁶ Pathol. of the Membrane of the Larynx and Trachea, p. 46.

^{&#}x27; Med. Obs. and Inq., i. 211.

² A View of the Diseases, &c., p. 109.

³ Coxe's Med. Museum, v. 195.

⁶ Rush's Works, ii. 227.

⁷ Comment. de Tracheitide, p. 122; Path. u. Ther. der Kehlkopfskrankheiten, p. 86.

<sup>Tractatus de Angin Memb. (1813), p. 114.
VALENTIN, Recherches sur le Croup, p. 607.</sup>

¹⁰ Enchiridion Med., art. Croup.

^{1&#}x27; RILLIET and BARTHEZ, Mal. des Enfants, i. 352.

¹⁸ Dict. de Méd., ix. 374.

¹⁸ Med. Klinik., iii. 2, p. 78.

have been first pointed out by Pringle, in 1768, since which time they have been highly esteemed by McGrigor, J. Johnson, Fergusson, Bampfield, Annesley, Latham, and other British practitioners, some of whom practised at home, but others had met with the disease in tropical climates. The latter employed very large and repeated purgative doses of calomel, while the former, for the most part, relied upon the alterative operation of the medicine. The treatment of dysentery by large and repeated doses of calomel appears to have originated with Annesley. In the first stage of the disease he gave scruple doses of it at night, and a cathartic draught on the following morning. His theory was that the restoration of bile to the fæcal discharges tended to remove the disease. Whether the practice in itself did more harm or good, cannot be inferred from his statements, since along with this already active treatment he often exhibited, three or four times a day, three grains of calomel with as much ipecacuanha, and one grain of opium, besides using general and topical bleeding, warm hip-baths, poultices to the abdomen, and small anodyne and emollient enemata. This treatment, we are told, does not at present find much acceptance in practice in any part of India, but has fallen into disuse,2 but we learn from the same authority, that the proper treatment of acute dysentery during the first two or three days of the disease, and in persons of good constitution, consists after bloodletting—in giving, at bedtime, ten grains of calomel with one or two grains of ipecacuanha, and the same quantity of opium, to be followed the next morning by one or two tablespoonfuls of castor oil. These medicines are to be repeated twice or thrice if necessary. Essentially the same rules are laid down by Martin, as they had originally been by Johnson.3 Morehead and Martin both deprecate the induction of the mercurial influence in dysentery, and inform us that, "as a rule of practice in India, it has been generally and certainly most properly abandoned." It is possible that time may work a still further revolution in the views of East Indian practitioners upon this subject. This change of sentiment was foreshadowed long ago by Mr. Twining, who used the following language: "Notwithstanding all that has been written in praise of the general employment of large and repeated doses of calomel, in the dysentery of India, whether that medicine be used to the extent of producing salivation or not; it will be easy to show that calomel is often not only useless, but that in many cases of the dysentery of Bengal, it is exceedingly injurious. I speak without hesitation on this subject, from having too often seen the fallacy of trusting generally to the effects of calomel, for the cure of the severe forms of acute dysentery; and having tried that medicine extensively in every stage of the disease."4

In the more temperate climates of the West the treatment by large and repeated doses of calomel at one time found numerous imitators, but among recent writers few of note are to be found as its advocates.

4 Diseases of Bengal, 2d ed., i. 100.

Diseases of India, p. 434 et seq. * Morehead, op. cit., i. 556.

^{*} The Influence of Tropical Climates, 1856, p. 234 et seq.

and that he was equally lavish of his patient's blood and his own calomel, we can only wonder that any subjects of his heroic plan survived. A late writer on disease in India omits nearly all allusion to this extraordinary method, and even speaks of his having formerly used moderate doses of blue pill as a work of supererogation.¹ It is now conceded that mercurials, in their ordinary mode of exhibition, are less than worthless in epidemic cholera; but there is another method, proposed by Dr. Ayre, of Hull, in 1832, and to which he always adhered. It consists in administering one or two grains of calomel every five or ten minutes, and in perseveringly continuing the same dose at the same intervals of time. One or two drops of laudanum are given with each of the first few doses of calomel. Certainly the apparent results of this method are more favorable than those of any other. In the reports of the London College of Physicians its success was rated much lower than it should have been, in consequence of its results being confounded with those in which calomel was used in larger doses, or at longer intervals, or associated with opium, with stimulants, &c. In a disease of such formidable symptoms as cholera there is strong temptation to use vigorous treatment, and a great deal of it, and hence the simple method of Dr. Ayre has been less generally employed than its success entitles it to be.3

Intestinal Worms.—It has been remarked elsewhere that mercurial vapors are generally fatal to insects and other organisms of a low grade, and hence, probably, has arisen the belief that mercury is adapted to destroy intestinal worms. But, as Brera remarked, the workers in quicksilver at Almaden, Idria, Chemnitz, and Freiburg are peculiarly subject to verminous complaints.³ It is true, on the other hand, that lumbricoid worms, and also ascarides, are sometimes voided and permanently removed during a course of mercury.⁴ Dr. Rush styled calomel "a safe and powerful anthelmintic," but remarked that, to be effectual, it must be given in large doses.⁵ The usual mode of administering it is in association with jalap. One of the best and most certain cures for ascarides of the rectum is to introduce into the bowel daily, at bedtime, a small portion of mercurial ointment. A solution of the bichloride of mercury (gr. ½ to gr. j in four fluid-ounces of water), used as an enema, answers the same purpose.

Metallic Mercury in Ileus.—In 1853 a Tuscan physician, Franceschini by name, published a memoir advocating the use of metallic mercury in obstruction of the bowels. Certainly he showed that it succeeded in removing simple fæcal accumulations. From fourteen cases of its administration in various intestinal affections he concluded that it always arrests the vomiting attendant upon them, and that it never does harm by its local action, and never produces ptyalism.

MOREHEAD, op. cit., i. 412.

² Compare Reports on Epidemic Cholera, by Drs. Baly and Gull, Lond. 1854; and Letters from Dr. Ayre, Lancet, Oct. 1853, p. 321; ibid., May, &c., 1854, pp. 536, 562, 591; Oct., p. 311; Shearman, ibid., June, 1854, p. 651; Taylor, Aug. 1854, p. 167.

^{*} On Verminous Diseases, by J. G. Coffin, p. 212.

⁴ OESTERLEN, Heilmittellehre, p. 116.

Med. Inq. and Obs., i. 213.

by an eruption upon the skin of the lower extremities, resembling lichen agrius, and giving rise to itching and burning. A continuance of the baths is very apt to augment these symptoms. These statements show plainly that the efficacy of the baths does not depend entirely upon their local operation.

Lotions of bichloride of mercury may be substituted for baths in diseases of a local character. Numerous specifics for eruptions of the face, which are sold by perfumers, contain this preparation. Gowland's lotion is one of the most celebrated of these; in it the excipient is

formed by an emulsion of sweet or bitter almonds.

Mr. Wardrop refers to a case in which a solution of corrosive subli-

mate was applied successfully to remove a corn.1

Ulcers, whether syphilitic or not, are often improved by mercurial dressings, when indolent, flabby, and in need of stimulation. For this purpose powdered calomel, white or red precipitate ointment, black or yellow wash, ointment of the nitrate of mercury, a solution of the pernitrate, &c., may be employed. Care must be taken lest by extent of surface or frequency of application, or, finally, by the strength of the preparation used, the constitution become affected. In some forms of skin disease which are obstinate by nature or by the accidents of the case, these preparations are often of signal service, e.g., lupus and very limited eruptions of psoriasis. In the treatment of acne simplex one of the best applications is a lotion containing a grain of corrosive sublimate to five or six ounces of water and a fluidrachm of alcohol or Cologne water. (Rayer.) M. Hardy used for the same affection an ointment composed of one part of protiodide of mercury to thirty parts of lard, and in the more chronic and obstinate forms an ointment made with equal parts of the deutiodide of mercury and lard. The latter is, however, too caustic in its action, and even the former occasions smarting, and its application is followed in two or three days by exfoliation of the epidermis.* Dr. Fuller treats favus of the scalp by cutting the hair short, and, after thoroughly washing the skin with soft soap twice a day, applying equal parts of "unguentum hydrargyri ammonio-chloridi," and unguentum picis liquidæ. The nitrate of mercury has been much employed as a caustic in cases of ulceration of the neck of the uterus, by Eméry, Lisfranc, and Bennett.

Red precipitate, citrine, and other ointments and mercurial solutions, have been long and are still used in a great variety of inflammations of the eyes, whenever, indeed, the exterior of the organ requires stimulation to promote its cure. This indication is most usual in the various forms of chronic conjunctivitis, and of inflammation of the edges of the eyelids. Lotions are most commonly employed in the former and ointments in the latter affections. Great care is to be observed in duly proportioning the strength of the application to the sensibility of the part.

Simple ozæna, as well as that connected with the syphilitic or scrofulous cachexia, is benefited by mercurial applications, in the form of

¹ Med.-Chir. Trans., v. 140.

² Abeille Méd., xiv. 131.

^{*} Times and Gaz., March, 1857, p. 263.

ment to the other, they will find, as he did, that the disease declines neither more nor less quickly under the former application than under the latter. It certainly, in some degree, allays the burning pain, in virtue of its unctuous qualities, but it at the same time exposes the

patient to the serious risk of salivation.

To Prevent Pitting in Smallpox. The reader will perhaps be interested in a succinct narrative of the evidence upon which rests the belief that mercurial ointment or the mercurial plaster is able to prevent the disfigurement which is so often the consequence of this loathsome disease. The first account of the subject with which we are acquainted is contained in Zimmerman's Treatise on Experience.1 "A lady who was salivated by a mercurial plaster, was afterwards attacked by smallpox, when her whole body was covered with pustules, except only that part on which the plaster had been applied. M. Malouin suggested whether, judging from this fact, it might not be possible to prevent the eruption in the same manner. The experiment has not yet been tried, but it has led to using a means of preserving the faces of females from the effects of smallpox. M. Roseen covered the face of one of his patients with mercurial plaster, and the eruption appeared everywhere but on the face. M. J. Henry Sulzer has repeated the experiment at Winterthor with equal success."

The method does not, however, appear to have been generally adopted, probably owing to a certain degree of trouble which the constant adjustment of the plaster requires; yet it did not wholly fall into disuse. Wedekind says,2 "it was long ago ascertained that mercurial plasters prevent the development of variolous pustules;" and he states that he obtained a like result by frequently using a lotion of corrosive sublimate. In 1833, Serre d'Alais and Ferrier, and soon afterwards Serres, of Paris, and Gariel, demonstrated the abortive influence of mercurial plaster upon variolous pustules. The last named physicians further showed that this property is not possessed by simple lead plaster. Sandras, in 1837, and Baudelocque, in 1838,6 obtained similar results with the mercurial lead plaster. The latter physician found that when the plaster was applied early, it entirely prevented the development of pustules; but, at a later period, it only produced induration of the pocks, or rendered the ulcers superficial. In 1839, Briquet performed some interesting experiments to determine the degree of the mercurial influence. In the first place, he produced vesication or pustulation of the skin in non-variolous patients by means of cantharides, croton oil, and tartar emetic, and found that the mercurial plaster had no influence at all upon the condition of the skin. then used it in cases of eczema, acne, erysipelas, and furuncle, with a

Edit. de Le Febvre, 1797, liv. v. chap. ii.

Beiträge zur Erforschung, &c., 1830, p. 113.

Dr. Graves met with a case in which a patient was covered with confinent variola, except upon the knee, which was enveloped in a mercurial plaster. (Dublin Quar. Jour., Feb. 1850, p. 115.)

⁴ Bull. de Thérap., v. 33.

⁶ Ibid., ix. 295; Arch. Gén., 2ème sér., viii. 468.
⁶ Ibid., xiii. 132–363.

<sup>Emplâtre de Vigo. Vid. U. S. Dispens., 10th ed., p. 952.
Bull. de Thérap., xv. 143.</sup>

as "extremely efficacious," a solution of two drachms and a half of bichloride of mercury in three ounces of water, of which a dessert-spoonful is mixed with a pint of very warm water, and employed as a vaginal injection and a lotion for the external organs. Wilson recommends the diluted nitrate of mercury ointment, the yellow, and the black wash.

Mercurial fumigation was once greatly in vogue as a means of treating syphilitic eruptions of the skin, and, indeed, other cutaneous dis-The red sulphuret (cinnabar), and the black oxide of mercury are the preparations which have been most employed in this way. The use of the vapors of cinnabar was, next to that by mercurial ointment, the oldest of all the methods of treating syphilis. The patient was seated naked in a wooden box or closet with an aperture in the top, from which the head projected. Cinnabar having been strewn on burning coals, or on hot iron, its fumes were conveyed into the chest and surrounded the patient's body. An apparatus of a similar description has been contrived for fumigating a single limb. Even in this way mercurial fumigation has sometimes occasioned salivation, apoplexy, nervous accidents, chronic trembling of the limbs, &c. It has therefore been gradually abandoned, but its well established efficacy and a more prudent method of applying it, promise to restore it again to its originally high rank among the applications of mercury to the cure of syphilis. Mr. Abernethy employed the fumes of the black oxide to induce the constitutional action of mercury with rapidity. Mr. Henry Lee prefers using the fumes of calomel. method has already been described.

Dr. Nevins has used the vapors derived from mercurial cigarettes with advantage in chronic thickening of the vocal cords, ozæna, nasal polypus, and catarrh of the Eustachian tube.¹ The cigarettes may be made after the following directions, as originally suggested by Trousseau. Take nitrate of mercury, and strong nitric acid, of each fifteen grains, distilled water a sufficient quantity. Mix the acid and water, add the nitrate of mercury and dissolve by a gentle heat. Saturate with the liquid a sheet of thick white blotting paper, six inches by eight in size, and dry it. Before it is entirely dry cut the paper into suitable strips for making tubes about one-eighth of an inch in diameter, and secure with gum. The interior of the tube may be stuffed with tobacco for those who are accustomed to smoking, but this addition it is better to dispense with. The paper when dry will burn steadily and its smoke on being drawn into the mouth should be directed upon the seat of the disease.

MISCELLANEOUS.—Dr. A. C. Castle has published the following ingenious method of removing a gold ring from a finger upon which it had been forced, and whence it could not be withdrawn on account of the swelling of the integuments. After drying the abraded skin with powdered chalk, he polished the ring, and applied quicksilver to its surface. In less than three minutes, by pressing the ring it was broken to pieces and removed. Dr. C., it is stated, used a similar method

¹ Liverpool Med.-Chir. Jour., iii. 117.

arsenic and iodine in the proportion of one of the former to five of the latter, by weight. It is "an orange red crystalline solid, entirely soluble in water, and wholly volatilized by heat."

Liquor Arsenici et Hydrargyri Iodidi. — Solution of the Iodide of Arsenic and Mercury; Donovan's Solution.

This preparation, according to the *U. S. Phar.*, is prepared as follows: "Take of Iodide of Arsenic, Red Iodide of Mercury, each thirty-five grains; Distilled Water, half a pint. Rub the iodides with half a fluidounce of the water, and when they have dissolved, add the remainder of the water, heat to the boiling point and filter through paper."

This solution is of a pale yellow color, and styptic in taste. It is incompatible with acids, opium, the salts of morphia, and many other salts. Dose, from ten minims to half a fluidrachm, three times a day,

in distilled water.

Liquor Potassæ Arsenitis.—Solution of Arsenite of Potassa; Fowler's Solution; Tasteless Ague Drop.

This is a solution of equal parts of arsenious acid and bi-carbonate of potassa in boiling distilled water with the addition of a small quantity of compound spirit of lavender, in order to give it sufficient color and taste to prevent its being mistaken for simple water. It contains four grains of arsenious acid to the fluidounce.

This preparation is a transparent liquid, and has no taste or smell but what it derives from the spirit of lavender. It is incompatible with the metallic salts, with infusions and decoctions of cinchona, and

with lime-water.

Dose, five drops, gradually increased to ten or twenty, three times a day, largely diluted, and taken after meals.

HISTORY.—The ancients were acquainted with auripigmentum, or orpiment, the yellow sulphuret, and with sandarach, or realgar, the red sulphuret, of arsenic. Of the former, Dioscorides says: It is astringent and corrosive, burning the skin with severe pain, and the production of an eschar. It removes fungous flesh, and is a depilatory. He describes the qualities of the latter in nearly the same terms; stating that, mixed with resin, it causes hair to grow when destroyed by pellagra, and that with pitch it serves to remove rough and deformed nails. With oil it is used to destroy lice, to resolve abscesses, to heal ulcers of the nose (lupus?), of the mouth and fundament. With wine it is given for fetid expectoration, and its vapors, with those of resin, are inhaled in chronic cough. With honey it clears the voice, and with resin is very excellent for shortness of breath. Pliny furnishes exactly the same description.2 Paulus Ægineta says, sandarach and arsenic, when taken in a draught, occasion pains of the stomach and bowels, with violent corrosion. The Arabians gave to arsenic a name equivalent to the modern one of ratsbane. Rhazes, Avicenna, and other Arabian writers, have done little more than copy the de-

4 Esy Baithar, ed. Southeimer, ii. 104.

¹ Mat. Med., lib. v. cap. lxxx. and lxxxi. ² Hist. Nat., lib. xxxiv. cap. lv. lvi.

ADAMS's Trans., Syd. Soc. ed., ii. 235; iii. 53.

knowing that it had been used upon the continent. He learned that a nostrum which, under the name of Patent Ague Drops, became famous for its cures of intermittent fever, about the year 1780, was an arsenical solution. It had, however, been still earlier employed in England. In 1774, Mr. Mowbray, a surgeon, purchased from the widow of a German empiric, a receipt for the preparation of a remedy which he had employed as a specific in the cure of agues. cipal ingredient was arsenic. This receipt Mr. Mowbray communicated to several of his medical friends, and employed, himself, with great success.² Besides Fowler, must be mentioned among those who gave currency to the use of the medicine, Withering, Pearson, Girdlestone, and Adair, in England, Horn, in Germany, and Barton, Rush, and Currie, in the United States. These, and many other physicians, established its value in intermittent fever, neuralgia, and scaly affections of the skin, the diseases in which its virtues are most conspicuous.

ACTION. On Plants.—An arsenical solution causes plants to fade, wither, and decay. The vegetation in the neighborhood of furnaces used for smelting arsenical ores, always presents a wan and withered Arsenic is also said to prevent the development of buds, and the germination of seeds. In regard to the latter point, Headland remarks: "The grain of wheat will germinate, and its starch be converted into sugar, after it has been steeped in a solution of arsenic to protect it from vermin." In this case the coriaceous nature of the envelop protects the germ from the contact of the solution. When plants have been killed by being watered with an arsenical solution, they exhale an alliaceous odor. M. Chatin thus describes the manner in which plants perish under this operation. They may die in the course of a few days, by desiccation, if they are in a dry place, or by putrefaction if they are in a moist one. Sometimes the plant resists the poisonous influence with partial success. Its growth ceases, its leaves become yellow and dry, and sometimes spots, gangrenous as it were, appear upon the stalk, &c. These changes are more rapid in summer than in winter. Nor does the poisonous action appear to be equally diffused throughout the plant. It is accumulated in the leaves and in the receptacles of the flowers, but still abounds in the fruit, seeds, and stems. If the plant does not immediately perish, it gradually recovers, as the poison is eliminated; and this is accomplished in a period varying from a fortnight to three months. The arsenic enters into combination with the alkalies of the plant, forming soluble salts which are excreted by the roots, and for some time may be found in the soil.4

On Animals.—Jæger found that animalculæ inhabiting vegetable infusions, perish in from ten to thirty minutes on the addition of a minute quantity of arsenious acid to the liquid. Arsenic is equally fatal to spiders, flies, worms, leeches, and crustaceæ, such as crawfish, &c.; and before killing these creatures it excites in them convulsive

¹ Fowler's Med. Reports. Preface.

W. Currie's View of the Diseases, &c., p. 29.

On the Action of Medicines, p. 198.

⁴ Toxicologie, i. 380.

which assumes a florid red color, becomes soft and pulpy, and is separable without much difficulty from the cellular coat, which presents its natural appearance. In some instances, there are small spots of extravasated blood on the inner surface of the mucous membrane, or immediately beneath it, and this occurs independently of vomiting. In none of his experiments did Brodie find ulceration or sloughing of the stomach and intestines, and he is disposed to believe that such lesions are never the cause of death, unless life is prolonged considerably beyond the period of the first and most characteristic operation of the poison.

On Man.—According to Mialhe, it is probable that metallic arsenic, and also its sulphurets (realgar and orpiment), are not in themselves poisonous. But the arsenical sulphurets of commerce contain a large proportion of arsenious acid. When either of these preparations, or metallic arsenic itself, is taken into the stomach, it may furnish to the alkaline chlorides contained in the gastric secretions, the material for forming arsenious acid in sufficient quantity to operate as

a poison.

External Application. When arsenious acid and other active preparations of arsenic are applied to the denuded skin, or to a mucous membrane, or are introduced into a wound, symptoms of arsenical poisoning ensue. Examples of this event are innumerable, but a few may briefly be cited as illustrations in this place. One of the very earliest is that recorded by Amatus Lusitanus, of a boy who (in 1567) died from the application of an arsenical ointment to the scalp for the cure of scabies. In another case, of pityriasis, a similar application was fatal.

Orfila mentions a woman who barely escaped with life after using an arsenical ointment for the purpose of destroying lice that infested her head. Dr. McCready, of New York, reports that a child two years of age died in consequence of having its head washed with a mixture of arsenic and gin, for the cure of favus. No local inflammation followed; but diarrhoea, tenesmus, and paraplegia preceded death. Two other children who were treated in the same manner recovered. In 1853 Dr. Mitchell, of Liverpool, reported the following case. A man applied a mixture of arsenic and soft soap, procured for killing bugs, to the pubes, scrotum, and axillæ, which were infested with pediculi. Within twelve hours the cuticle of the scrotum peeled off, leaving the cutis raw and bleeding, and the testes swollen. There was stiffness of the neck, and slight difficulty of swallowing, with thirst, headache, and extreme sensitiveness and tension of the hairy scalp. The stomach was irritable, and there was also vomiting, with pain at the epigastrium on pressure. Recovery took place slowly under the influence of opiates and demulcents.3

A man engaged in washing sheep with an arsenical solution, had had his abdomen wet with it for about two hours. Shortly afterwards, the integuments of this part, and of the scrotum, penis, and

Chimie Appliquée, p. 248.

* Am. Jour. of Med. Sci., July, 1851, p. 259.

³ Times and Gaz., Dec. 1853 p. 612.

where this hazardous experiment was performed. A case is quoted by Beck, from Vandervoort, of some men, nine in number, who were employed in sweeping up arsenic scattered in the hold of a vessel, from a barrel of this substance which had been broken in the hoisting. Several were seized with vertigo, and fell senseless; they were then attacked with vomiting and the other symptoms of arsenical poisoning. Of the nine cases two or three proved fatal in the course of a few days. Numerous instances are recorded of alarming effects from arsenical They generally include the following: debility, dyspnœa, præcordial pain, and constriction, with severe cough: headache, pains in the limbs, muscular spasms, and paralysis; thirst, nausea, vomiting, dryness of the mouth and fauces, and colic; and, where the influence is prolonged, ulcers form upon the buccal mucous membrane. pulse is generally frequent, and in some cases yellow spots appear upon the skin. Dr. Hinds, of Birmingham, relates that having had the walls of his study newly hung with a bright-green paper, which was afterwards found to be stained with Scheele's green (arsenite of copper), and after occupying the apartment by gas-light, he was affected with great depression, faintness, nausea, an inclination to vomit, and severe pains in the abdomen.3 Similar effects have been observed in girls and others engaged in the manufacture of artificial leaves and flowers. Miners, and other workers in arsenic, suffer more or less in their health from the poisonous exhalations. The diseases engendered are essentially chronic, but very fatal. There is a constant and slow fever, with loss of flesh, colic, and paralysis. Schweinfurth's green, which is a solution containing equal quantities of arsenious acid and acetate of copper, used in the manufacture of paper-hangings, produces in the workmen who handle it vesicles, pustules, and ulcers upon the hands, and on parts of the body habitually touched by the soiled fingers.

Internally. In small or medicinal doses ($\frac{1}{30}$ to $\frac{1}{15}$ of a grain), arsenic excites a sense of warmth in the stomach and bowels, increases the appetite, and in some degree also the fæcal and urinary discharges. According to Vogt, this stimulant effect is shared by all parts of the

² Med. Jurisp., from N. Y. Jour. of Med. and Surg., ii. 483.

¹ Richter, Ausfür. Arzneim., v. 679.

Times and Gaz., Feb. 1857, p. 177. Numerous other cases of illness from the same cause have been published, all tending to show the extremely deleterious nature of the pigment referred to. The following articles upon this subject may be consulted: Hinds, Times and Gaz., May, 1857, p. 521; ibid., Jan. 1858, p. 64; Halley, ibid., p. 76; Griswold, New York Jour. of Med., July, 1858, p. 64; Whitehead, Brit. and For. Med.-Chir. Rev., April, 1859, p. 519; Hassall, Lancet, Jan. 1859, p. 70; Taylor, Times and Gazette, Jan. 1859, pp. 5 and 94; Kesteven, ibid., p. 43; and Wright, ibid., p. 169; Lancet, Nov. 1860, p. 494, and Dec. 1860, p. 535: Boston Jour., Nov. 1860, p. 299; Annales d'Hygiène, 2d ser., xv, 201; Henke's Zeitschrift, lxxxi, 78; Deutsche Klinik, July, 1861, p. 261; 299; London Lancet, and Times and Gazette, 1862. Vohl has shown (Casper's Vierteljahrs., xv. 172) that each square yard of such paper as is referred to in these cases contains, on an average, one grain of arsenious acid, five-sixths of a grain of oxide of copper, and one grain and a quarter of oxide of lead.

⁴ Patissier, Maladies des Artisans, p. 20.
⁵ Follin, Archives Gén., 5ème sér., x. 683; Pietra Santa, Annales d'Hygiène, 2ème sér., x. 339; Guy, Archives of Med., i. 86; Prager Viert., lxvii., Anal., p. 112; N. A. Med. and Surg. Rev., iv. 1111; Brit. and For. Med.-Chir. Rev., Oct. 1863, p. 536.

tageously administered Fowler's solution in cases of asthma. The toxiphagi commence with a bit of arsenic the size of a lentil-seed, or about half a grain. They keep to this dose, which they swallow several times a week, morning and evening, for a long period, to become accustomed to it. Then they increase the quantity insensibly, but with precaution, until the desired effect is produced. It is to be remarked, however, that, when the practice is dropped, emaciation generally ensues from some cause, either from the withdrawal of the stimulus, or from accidental or acquired disease."

The accounts above given by Vogt and Tschudi, and which are substantially confirmed by Kaltenbrenner, Vitzhum, and other writers, has been ridiculed or contradicted by Pereira, Christison, Taylor, Kesteven, and Inman. They assert that the descriptions of the practice of arsenic eating are derived from hearsay evidence alone; question whether the substance used is really arsenic; declare that its alleged effects are at variance with common experience in regard to arsenical preparations, and opposed to those known to be produced by arsenical emanations upon the miners in Cornwall, &c. criticisms being all based on conditions presumed, but not proved, to be analogous to those which exist when arsenic is taken under ordinary circumstances as a medicine, should have but little weight in opposition to direct and circumstantial testimony.2 We do not know whether the preparation used in Styria is arsenious acid, or one of the sulphurets of arsenic which bears the same name. If the latter, it might explain the dose alleged to be taken with impunity in the beginning of the practice. It is also to be remarked that the ancients employed arsenical preparations for "shortness of breath." there is, apart from these statements themselves, some reason to believe that toleration of arsenic may be partially, at least, produced. Flandin states that he gave animals doses of arsenious acid in powder, commencing with one sixty-fifth of a grain mixed with their food: and that in nine months, by progressive increase, they bore a dose of upwards of fifteen grains of arsenious acid in powder in twenty-four hours without their appetite or health becoming affected.3 This, says Dr. Taylor, "is contrary to all experience in the medicinal use of arsenic in the human subject;"4 but it tallies with the statements respecting the arsenic eaters of Austria, and unless, therefore, some direct refutation can be given to both, it is difficult to perceive why they should be rejected as untrue. The miserable consequences of the vice described by Tschudi are pictured in terms which could scarcely have been used except to portray a reality, and this, of itself, while it lends probability to the account given of arsenic eating, is surely enough to deter any one from falling into so degrading and fatal a vice.

The solution of arsenite of potassa, in doses of two or three drops,

¹ Times and Gazette, July, 1854, p. 66.

See Br. and For. Med.-Chir. Rev., Jan. 1862, p. 142, where the question is examined, and the alleged tonic and superptic operation of arsenic eating is discredited.

³ TAYLOR, On Poisons, p. 6. ⁴ Ibid. (2d Am. ed.), p. 94.

feet, and are a source of extreme suffering; stiffness and contraction of the extensor muscles of these parts succeed, numbness gradually invades the extremities, and the mental faculties subside into insensibility and torpor; cedema of the face and extremities, and even general anasarca are not unusual; at the same time the hair falls out, the epidermis scales off, pustular and other eruptions ending in ulceration attack the skin, which assumes a lifeless, earthy hue, the countenance, if not cedematous, is sunken, the conjunctiva is strongly injected, and a reddish circle surrounds the eyes. Such phenomena are most frequent among workmen engaged in the sublimation of arsenical ores.

The symptoms of acute arsenical poisoning may be thus described: Immediately after the poison is swallowed, a metallic taste is perceived, with constriction of the fauces. A violent burning pain, which soon becomes excruciating, is felt in the stomach, and gradually extends itself over the whole abdomen, steadily increasing in severity until it becomes intolerable. Retching and vomiting, and cramps of the bowels, ensue, with spasms of the œsophagus and chest, which resemble those of hydrophobia. The thirst is insatiable, but even the mildest drinks cannot be retained; the tongue is generally fissured, hard, and dry, although occasionally there is profuse salivation, and the voice is hoarse. There is also tenesmus, with bloody and offensive stools, and retraction of the abdomen. The irritation is propagated to the urinary organs, occasioning, in the male, tumefaction of the penis, and in both sexes strangury. Sometimes the urine is completely suppressed, and sometimes it is mixed with blood. Prof. Christison says that in the female there is burning pain in the vagina, and excoriation of the labia, "but this does not happen unless life is prolonged beyond three Bachman had previously noticed the pain alluded to, and also profuse menorrhagia, among the symptoms in females. The pulse is rapid, irregular, and intermittent; the muscles are spasmodically affected; the skin presents a livid eruption of the species already mentioned. The sense of anguish is unutterable, and sometimes there is delirium. The breathing is oppressed. A consuming fire appears to prey upon the vitals, while the skin is everywhere pale, cold, shivering, The features are sunken and sharp; if vomiting occurs, it is convulsive and affords no relief. Exhaustion of mind and body, prostration and despair, with anxious restlessness, generally attend this stage of the attack. On the approach of death, spasm yields to general resolution, the pulse grows slow and feeble, and the urine and fæces are voided involuntarily; but sensibility and consciousness are lost only in the last moments of life.

The duration of the symptoms is variable, and may be stated in general at from six to twelve hours; but occasionally they last for several days. Sometimes, also, though rarely, a fatal termination takes place almost immediately after the poison is swallowed, and without other symptoms than slight fainting fits. Dr. Christison has collected fourteen or fifteen cases of acute arsenical poisoning in which the signs of inflammation, after death, were slight, or altogether wanting, and the fatal issue occurred in five or six hours, with symptoms de-

not occur, nor were any remedies administered for an hour and a half. Within five days complete recovery had taken place. A case published by Dr. W. C. Jackson, seems to show that the stomach may sometimes appear to be comparatively insensible to the action of the poison. A quantity of arsenic, estimated at two ounces, was taken when the stomach was empty; there was great heat in this organ and in the throat, and irritability of the former after the active use of emetics, but within twenty-four hours even these symptoms had nearly disappeared. On the other hand, very small doses may produce violent and even fatal symptoms. This is particularly the case when an arsenical solution is taken. Under such circumstances, four, three,

and even two grains of the mineral have destroyed life.

Modus Operandi.—The caustic operation of arsenic demonstrates how readily it enters into combination with the constituents of the body. Its detection in so many of the organs and secretions, and the symptoms which it occasions in the former, render evident its wide diffusion through the economy. The fact that, however introduced, its effects are essentially the same, and that it frequently, when swallowed, is fatal without producing any gastric lesion whatever, proves, also, that its action is not merely local. Further, this presumption is sustained by all the phenomena of chronic arsenical poisoning. gastro-intestinal symptoms usually produced by arsenic in the human subject, and in animals poisoned by it, even when it is applied to the skin, show that it seeks an outlet from the system by the bowels; while the fatal cases just alluded to, in which no gastric lesion was produced, prove, on the other hand, that its chief morbific (and curative) operation is upon the system at large. These facts and conclusions point to the blood as the probable seat of the changes upon which its sensible effects depend. What these changes are, has not been revealed by any direct observation. The fluidity of the blood observed in some cases of arsenical poisoning is not present in all; but the production of serous effusions as an ordinary effect, and of chronic anæmia as the consequence of prolonged exposure to arsenical influences, appear to furnish grounds for believing that in sufficient doses, arsenic, like mercury, tends to disintegrate the blood-corpuscles, to diminish the proportion of fibrin, and possibly, also, to attack still more directly the vital principle upon which the normal qualities of the blood depend. This theory is not inconsistent with the results obtained by the administration of arsenic in minute doses, and which have led to a tonic virtue being attributed to it. In such doses it unquestionably stimulates the stomach, either by its direct action or by its secondary operation, and probably at the same time promotes the secretion of the liver, pancreas, and mucous glands. If so, it does what all condiments are intended to effect, facilitate digestion, and by that means improve nutrition. Indeed, arsenic has, with the irritant condiments (pepper, mustard, ginger, &c.), this common quality, that when the habit of using it is suspended, digestion languishes, and the health declines.

¹ Lancet, Aug. 1857, p. 114.

² Am. Jour. of Med. Sci., July, 1858, p. 77.

In despite of these and many other similar proofs of its efficacy arsenic did not succeed in supplanting cinchona as a remedy for periodical fevers, and it gradually ceased to be used for this purpose, except in certain chronic cases, which were found intractable to bark. The discovery of quinia and its salts served still further to throw arsenical preparations into the background, and we should probably not again have heard them proposed, as a general means of treatment, had not the supply of Peruvian bark threatened to fall short of the demand for this precious drug.

In 1845 M. Boudin, a French military surgeon, addressed a communication to the Academy of Medicine, in which it was stated that during the previous five years he had treated 2947 patients with arsenical preparations, and had never met with any accident attributable to the medicine. His patients were treated in Senegal, Algeria, Syria, Italy, Corsica, the mouths of the Rhone, and Strasbourg, at all seasons, and at every period of life. He gave arsenious acid the preference over the arsenite of potassa, and administered it in doses of one-fifth of a grain dissolved in about three ounces of distilled water. Three doses were generally prescribed in anticipation of the paroxysm, at intervals of two hours, and so that the last dose should precede the attack by three or four hours. Once the fever was arrested, a single dose was administered daily for about a week. By this plan M. Boudin found that the whole duration of the treatment was generally short, and that relapses were much less frequent than after the use of bark and its preparations.1 In like manner Maillot and Masselot, the former at Lille, and the latter at Versailles, used this remedy with good effect, and a number of physicians both in Germany and France have imitated their example. M. Frémy treated 361 cases of ague, of which 106 were cured by arsenic without having been subjected to any other treatment, and 158 after quinia had failed. He conceived it to be most applicable to chronic cases, and especially to those which had resisted the preparations of bark.3

On the other hand, several authorities of equal weight set a much lower value upon this plan of treatment. In 1849 and 1850, Jacquot made trial of the arsenical treatment in 282 cases of intermittent fever occurring at Rome, and his conclusions were decidedly adverse to its utility. In particular, he remarked that it is not allowable to substitute arsenic for quinia in the treatment of the malarial fevers of warm climates, because the attacks are often grave, and require to be met by a large dose of the specific remedy, which in the case of arsenic would be unsafe or impracticable. He concludes that arsenic is only allowable in chronic cases which have resisted quinia. M. Gintrac, of Bordeaux, after giving an impartial summary of the experience of other physicians on this subject, and showing that the weight of testimony is decidedly adverse to a belief that arsenic is comparable to quinia as an antiperiodic, presents the results of his own observations,

³ Times and Gaz., Sept. 1857, p. 302.

Archives Gén., 5ème sér., iii. 678.

¹ Bull. de l'Acad. de Méd., x. 1010.

² Archives Gén., 4ème sér., x. 121, 456, and xi. 56; where the reader will find all that can be said in favor of the arsenical treatment of intermittents.

been used by Adair in 1783–4.¹ But some of its earliest successful applications to the cure of skin diseases were made in the United States, by Drs. Martin, of Maryland, and Potter, of Philadelphia,² as early as 1796. In 1804, Dr. Otto, of the latter place, cured an obstinate case of eczematous eruption and other skin diseases, with the arsenical solution.³ Soon afterwards (1806) Dr. Girdlestone, of Yarmouth, England, published an account of his successful use of the remedy "in some hundreds of cases of lepra, lichen, psoriasis, tinea capitis, &c." Subsequently it was employed and eulogized by Willan and Bateman in England, and by Biett in France, and these physicians soon found imitators of their practice and success. But, on the whole, its reputation in cutaneous affections rests upon its efficacy in scaly eruptions and in chronic eczema.

Cazenave and Schedel, following in the path of Biett, advise the arsenical solution as the best remedy for lepra and psoriasis. Its first effect, they state, is an increased activity in the eruption, which grows redder and more irritable; then the central portion of the patches becomes healthier, the edges crack and gradually subside, and often in less than two months the disease disappears after a tormenting duration of several years. In a case published by Cazenave, the patient who, for fifteen years, had been afflicted with psoriasis inveterata was cured in twenty-six days by means of Fowler's solution, and

that without any constitutional disturbance whatever.

Yet, however prompt and decidedly curative this treatment sometimes is, its success is by no means uniform, and they who employ it should not be too profuse of their promises to cure. Emery, whose high authority will not be contested, says: "I have notes of 140 cases of psoriasis, or lepra vulgaris, treated by various arsenical preparations, and of this number only 38 left the hospital apparently cured, after a treatment of two, four, six, eight, and even fifteen months. the course of eighteen months 22 of these patients returned with a renewal of the disease. Of the remainder, 40 were more or less benefited, and 62 experienced such various ill effects from the medicine that, after eight or nine months of fruitless efforts, I was obliged to abandon it." At the same time, Emery admits that, after all, arsenic is the best internal remedy for psoriasis, and by combining its use with the external application of tar ointment he obtained the highest degree of success. This, indeed, accords with general experience. The effects of a pure arsenical treatment were found by Gibert to be almost identical with those observed by Emery. Out of 98 cases subjected to this method, only 40 were cured, and 38 improved. Dévergie prefers Fowler's solution to all other medicines in the treatment of scaly eruptions. He, however, does not think it of much utility in cases of inveterate psoriasis—those, for instance, of ten years' duration or more. In its administration, he commences with two drops

Dict. de Mat. Méd., i. 441. CALDWELL'S Medical Theses, p. 61.

Philad. Med. Museum, i. 47. Med. and Phys. Jour., xv. 297.

Abregé Prat. des Mal. de la Peau, 2ème ed., 1833.

Journal Hebdomadaire (1828), i. 258. 7 Bull. de Thérap., xxxvi. 481.

Bull. de Thérap., xxxix. 115.

have been subdued. These results are further confirmed by Dr. Handfield Jones.1 We found it the only one of a great variety of remedies which promoted the cure of an inveterate case of this disease affecting the whole body.

Of the other forms of skin disease, chronic impetigo and lichen are occasionally benefited by arsenic, when the inflammatory element has entirely disappeared; and a case is on record in which it cured chronic pemphigus on several successive occasions, but did not prevent its return. In another recorded case a similar result was attained, but the same remedy again removed the eruption.3 Donovan's solution (Liquor Arsenici et Hydrargyri Iodidi) contains only one-quarter as much arsenic as Fowler's solution; but the union of arsenic with the two great alteratives of the Pharmacopæia is supposed to impart peculiar virtues to the compound. It appears to be especially adapted to those cases of scaly eruption which are of syphilitic origin, hereditary or acquired. Apart from this complication, squamous affections of the skin are apt to be aggravated by the use of any preparation containing mercury.

Among other diseases for the cure of which arsenic may be given internally, is chronic rheumatism. As early as 1804, Mr. Jenkinson, of Manchester, used the arsenical solution in some cases of this affection, such as were afterwards described by Haygarth as "nodosity of the joints."4 Bardsley thought "that it is only in the protracted chronic rheumatism, where the vital powers are much diminished, and the ends of the bones, periosteum, capsules or ligaments of the joints, are likewise partially affected, that the use of arsenic is likely to prove eminently successful." In the form of disease, to which Dr. Haygarth gave the name above mentioned, he found it of great service; and Dr. Christison says that he has known several cases of this affection get well under the continuous administration of arsenic for several weeks. Guéneau de Mussy treated it successfully by means of prolonged warm baths containing from fifteen to forty-five grains of arsenite of soda, according to the febrile or the apyretic form of the disease. Eberle presents a similar account of its virtues, which he thought were very decidedly evinced in syphilitic rheumatism, but most of all in the form following "the imprudent use of mercury." Similar attestations of the value of this treatment have been furnished by Fuller, and Begbie. The form of rheumatism referred to by these writers appears to be that which generally yields to iodide of potassium, or to an alterative course of mercury. But in some cases circumstances may exist, difficult to state with precision, but still which prevent the curative action of these remedies, or render mercury, at least, unsuitable. In such cases the arsenical solution should be tried.

Chorea is an affection which is often more amenable to arsenic than

¹ RANKING'S Abstract (Am. ed.), xxiii. 113.

^{*} Times and Gaz., Jan. 1864, p. 10.

⁴ Lond. Med. and Phys. Jour., xi. 492.

⁶ Dispensatory (Am. ed.), p. 252.

⁸ Therapeutics, 6th ed., p. 255.

⁹ RANKING'S Abs. (Am. ed.), xxv. 37.

² Lancet, Feb. 1859, p. 158.

⁵ Med. Reports, p. 32.

⁷ Bull. de Thérap., lxi. 189.

¹⁰ Loc. inf. cit.

doses, from three to ten drops of Fowler's solution, two or three times daily; it should be persevered in until the toxic effects show themselves, in sickness, a sense of fainting, formication in the toes and fingers, dryness of the fauces, and white tongue; then a pause should be allowed, and the solution be resumed as soon as those symptoms have subsided."

Asthma.—In certain cases of shortness of breath, which, however, are not well determined, arsenic appears to be of service. The ancient use of sulphuret of arsenic for asthmatic affections has already been noticed, and it may now be added that, according to Moschati, the mountaineers of Dalmatia and Albania are in the habit of employing the inhalation of arsenical vapors in chronic disorders of the lungs. Some cases illustrative of its use in such affections, have been published of late years, but are not very conclusive as to the efficacy of the remedy. Trousseau found that in tuberculous phthisis it sometimes suspended the progress of the disease in a remarkable manner. He gave arsenious acid in doses of 215 to 1 grain, and caused his patients to smoke cigarettes made of paper saturated with a solution containing half a drachm or a drachm of arsenite of soda, in three drachms of water. Such inhalations, we should suppose, might be mischievous, unless closely watched.

Uterine Disorder.—Dr. Hunt mentions that he was successful in curing a number of cases of menorrhagia, which he publishes at length.3 In most of them the hemorrhage appears to have depended upon a feeble rather than a sthenic condition of the uterine system. ployed Fowler's solution, and also arsenious acid; of the latter the dose prescribed was 20th of a grain three times a day. Dr. Locock, from whom Dr. Hunt originally derived the suggestion for using this remedy, found it advantageous not only in atonic menorrhagia, but also in the acute form of the affection after depletion had been resorted to. Dr. Hunt also found arsenic a valuable remedy in dysmenorrhæa and leucorrhæa, and all forms of uterine disorder associated with rheumatism. Dr. Simpson used it successfully in amenorrhea, as well as in that peculiar affection of the bowels characterized by a copious discharge of membranous shreds, and accompanied by great emaciation, and a long train of neuralgic amd other nervous symptoms.

M. Imbert-Gourbeyre has drawn attention to the great utility of Fowler's solution in the treatment of vulvar pruritus.

Arsenic has been used in various other affections, as whooping-cough, epilepsy, tetanus, furunculus, snake-bites, dropsy, &c., but its efficacy in all of these affections is too uncertain to entitle it to confidence.

External Application.—Cancer. It may be proper to premise a few words respecting the use of arsenic as an internal remedy for this disease. Harles recites the names of many distinguished physicians who used it with marked success, and among them Lentin, Frick, Tode, Adair, and Roennow. The last mentioned is said to have employed

¹ Op. cit., i. 53.

Med.-Chir. Trans., xxi. 277.

[•] Edinb. Med. Jour., iii. 978.

^{*} HARLES, op. cit., p. 106.

⁴ Lancet, April. 1838, p. 93.

Times and Gaz., p. 505.

several times in succession. Rousselot's powder consisted of two drachms of arsenious acid, mixed with two of the bisulphuret of mercury, and the same quantity of dragon's blood. In our own times Dupuytren was in the habit of using a powder composed of ninetynine parts of calomel to one of arsenious acid; the latter was sometimes increased to five or six parts in the hundred. From time to time the treatment of cancer by arsenical paste, after having been laid aside by surgeons, acquired a certain vogue through the reports of cures wrought by its use in the hands of irregular practitioners. Thus, Dr. Rush gives an account of a medical quack, who was said to be very successful in the treatment of cancer by means of a powder which was found to contain arsenic. It is, however, particularly stated that these cancers were seated upon the nose, cheeks, and surface of the body or extremities, and not in the neck, breast, or axilla. Hence it is possible that they were cases of lupus merely. A similar account is given by Dr. Thomas Sewall, who was persuaded of the curative virtues of the application.

In regard to the value of arsenical caustics in cancer, Dr. Walshe remarks: "That arsenical preparations have with some frequency effected a cure of cancerous ulcers in the manner described is a fact concerning which no doubt can be held." But, after mentioning that the paste causes a slough which separates in from two to six weeks, and that sometimes a second and third application of it is required, he continues: "The dangers increase to such a degree that it is now a matter of received doctrine that these preparations should only be used in cases of superficial cancer." Indeed, it is certain that numerous persons treated by their means have perished miserably from pain, inflammation, or hemorrhage following the application. difficult to perceive what advantage the tedious and very painful operation of caustics can possess over the speedy and less painful action of the knife, and least of all since the use of anæsthetics has done so much to deprive the surgeon's hand of its terrors. Yet the use of caustics for cancer has always been and continues to be a favorite field for the manœuvres of quackery, and hardly a community exists that has not furnished one or more victims of its cruel operations.

In the treatment of lupus, which is a tuberculated scrofulous inflammation of the skin, several caustics are employed, such as the Vienna paste, the chloride of zinc, and the acid nitrate of mercury, but when the tubercles are large it is necessary to select one that acts powerfully and deeply, but not to apply it upon an extensive surface, for fear of the danger of arsenical poisoning. M. Lebert relates that Pope Gregory XVI., having a cancroid ulceration of the nose, which the Roman surgeons were unable to heal, M. Allertz, of Aix-la-Chapelle, was consulted, and was successful in producing its complete cicatrization. It appeared afterwards that he employed the arsenical paste of Frère Côme, which had previously been used, but less thoroughly.² If this caustic is selected, it should be very

N. England Jour. of Med., iv. 111.

² Maladies Scrofuleuses, p. 263.

resorted to. Of these, opium and alcoholic liquors are the most important. The utility of the former is sometimes very decided by relieving the pain and sustaining the strength, and, perhaps, also by diminishing the rapidity of the absorption of the poison. It should be given in doses adapted to stimulate but not to narcotize the patient, that is to say, in small quantities repeated at short intervals. This intention will be promoted by wine or brandy administered along with the opiate or in the intervals between the doses of the latter.

It is sometimes advised to use depletion, both local and general, to combat the inflammation of the stomach, but however clear the indication for an antiphlogistic treatment may be, if drawn merely from the physical condition of this organ, there is in reality a state of the system which takes precedence of the local derangement, and calls more imperatively for relief. The symptoms in fatal cases are often those of depression and a tendency to collapse. If these are not combated the patient must die, under the combined pressure of the local and the constitutional poisoning; but if the system is upheld until the violence of the attack has spent itself, the restorative power of nature an be exercised with less restraint.

IODINIUM.—IODINE.

Sources. Preparation.—Indine is one of the most widely disseminated of the elementary bodies. According to M. Chatin it exists in rain water and in the atmosphere. It is found in every kingdom of nature, but most abundantly in plants which grow upon the seashore, and in marine zoophytes. Among the products of the ocean the natural family of Alge furnish it most abundantly, and those which inhabit deep water possess it in largest proportion. been detected in many fresh water plants (confervæ), and in several land plants or their products, and particularly in the agave mexicana. Of animals, those of the genus Spongia, and a great number of shell fish, are rich in this product. It has also been found in eggs, in milk, especially of the ass, in cod-liver oil, and in human urine. An insect met with in Italy, Julus fætidissimus, emits, when disturbed, a yellow fluid smelling strongly of iodine, and which immediately strikes the characteristic violet color with starch.* Iodine exists, also, in various mineral springs of Germany, Italy, France, and other parts of Europe, especially in those of Heilbronn, Kreuznach, Saleset. Cauterêts, and Barêges. In the United States the iodine spring of Saratoga is said to contain 3.5 grains of hydriodate of soda to the gallon of water. It also exists in the Kenhawa saline waters, and in those of western Pennsylvania.

The iodine of commerce is procured from kelp, i. e., the ashes of sea weeds, by mixing them with water and evaporating the solution until all the saline matters contained in the lixivium are precipitated except

¹ Bull. de l'Acad., xxiii. 346.

² Br. and For. Med. Rev., v. 163.

a troyounce of iodide of potassium in a pint of alcohol. It is a more permanent preparation than the simple tincture, and has over the latter the great advantage that its iodine is not precipitated on the addition of water. Hence it is much better adapted for internal use. It is also much more readily absorbed, and therefore may be applied externally when it is desired to affect the system by this mode, or to influence local organic changes. It is much less irritating than the simple tincture.

The compound tincture of iodine may be administered internally in the dose of from ten to thirty drops, largely diluted with water or

some mild liquid.

Liquor Iodinii Compositus.—Compound Solution of Iodine; Lugol's Solution.

This preparation is made by dissolving three hundred and twenty grains of iodine and a troyounce and a half of iodide of potassium in a pint of distilled water. It is a stronger solution than the last, and differs from it also in having water for a menstruum instead of alcohol. Owing to this circumstance, it is less objectionable as an internal medicine. It is, however, used as an external application, and, when largely diluted with warm water, by inhalation also.

The dose of this solution is from five to fifteen drops in a draught of

sweetened water, and repeated two or three times a day.

Unguentum Iodinii.—OINTMENT OF IODINE.

This preparation is made by rubbing together twenty grains of iodine and four grains of iodide of potassium with six minims of water, and incorporating the mixture with a troyounce of lard.

Unguentum Iodinii Compositum.—Compound Ointment of Iodine.

This ointment is prepared by rubbing together fifteen grains of iodine and thirty grains of iodide of potassium with thirty minims of water, and incorporating the mixture with a troyounce of lard.

It is much preferable to the simple ointment of iodine, on account of the proportion of iodide of potassium which it contains, and which is more readily absorbed by the skin, while its local irritant effects are equal to those of the other preparation.

Unguentum Potassii Iodidi.—Ointment of Iodide of Potassium. This ointment is made by dissolving sixty grains of iodide of potassium in a fluidrachm of water and mixing the solution with a troyounce of lard.

Sulphuris Iodidum.—Iodide of Sulphur.

By rubbing together four ounces of iodine and one of sulphur, and heating the mixture to fusion, this compound is obtained. It is a solid of a grayish-black color, having the radiated appearance of sulphuret of antimony. It stains the skin like iodine, and has the odor of this substance. It is chiefly employed as an external application, but may also be given internally in the dose of from one to six grains, and in pilular form.

Unguentum Sulphuris Iodidi.—OINTMENT OF IODIDE OF SULPHUR. Thirty grains of iodide of sulphur incorporated with a troyounce

or burnt sponge had been employed. In the same year, Coindet, of Geneva, finding that the varech (fucus vesiculosus) had been used as a remedy for goitre in the same way as burnt sponge, suspected that the iodine which both contain was the source of their curative properties. He accordingly put his conjecture to the test of experiment, and met with astonishing success, an account of which he published in July, Immediately the new remedy became famous, and was employed not only for its original purpose, but for various and discordant objects, many of which it failed to accomplish. It was also used with so little circumspection as to occasion the serious results of acute and chronic poisoning; so that it began to be viewed with distrust, and was prescribed reluctantly. The gradual introduction of iodine into medical practice, through the influence of Coindet, Lugol, Biett, Gairdner, Lallemand, Velpeau, and, more recently, by Gibert and Boinet, has overcome the disfavor with which its preparations were viewed, and they now stand second in value to mercury alone among alterative medicines.

ACTION. On Plants. — According to Cantu, the seeds of plants sown in clean sand, and watered with a solution of iodine, germinate rather sooner, and produce somewhat hardier plants than usual. Results, the very opposite of these, were obtained by Vogel, Robin, and Bouchardat, the last named of whom asserts that plants die, in the course of two or three days, in water containing one-thousandth part of iodine, and that a somewhat stronger solution of iodide of potassium is very injurious to them. These discrepancies are perhaps reconcilable by a reference to the quantity of iodine employed in the several experiments. In minute proportion, it probably promotes vegetation, for it exists in many of the most fertile soils.

On Animals.—According to Bouchardat, iodine is an active poison of the lower animals, for fish perish in from two to five minutes in a watery solution containing only the one-thousandth part of this substance.

When small and often repeated doses of iodine, or of its tincture, are given to animals, they produce general excitement of the nervous and arterial systems, irritation of the stomach and bowels, shown by vomiting and diarrhæa, an increased flow of urine, and a gradual but progressive emaciation of the whole body, but especially of the glandular structures. Larger doses occasion more decided evidences of gastro-intestinal derangement, and very large ones produce inflammation and ulceration of the stomach, generally terminating in death within a week. Yet some animals recover in spite of excessive doses of iodine. Dick, of Edinburgh, gave iodine to a horse for three weeks, in doses of from one to sixteen drachms, or on an average, two drachms, without any other effect than to create a marked aversion to water.

As an illustration of the effects of iodine in large doses, the following experiment of Orfila may be quoted. Ten drachms of iodine were given to a dog of medium size. It appeared to irritate the

Med.-Chir. Trans., xi. 432.

³ Boinet, op. cit., p. 47.

[•] Toxicologie, i. 97.

BAYLE, Bibl. de Thérap., i. 1.

⁴ STRUMPF, Handbuch, ii. 666.

When a solution of iodide of potassium is injected into the veins of an animal, death takes place very speedily, and is preceded by convulsions. Experiments upon larger as well as smaller animals, such as horses and rabbits, and performed by various persons, have furnished almost identical results. In most cases the blood is of a bright

red color, and shows but little tendency to coagulate.

Upon Man.—Externally. On the Skin. When iodine mixed with an unctuous substance is applied by friction to the skin, and especially if the integument is delicate, a sense of warmth is perceived, with more or less redness, prickling, and burning, which may indeed become very severe. The tincture of iodine stains the skin of a yellow or brownish-yellow color, which gradually disappears; but if the tincture be strong or the skin tender, an exfoliation of the cuticle usually takes place. Sometimes the application is followed by an erythematous inflammation which may extend beyond the part covered by the solution and occasion a burning pain and some fever. Sometimes, also, a measly or papular eruption appears, and, in either case, if the part affected is furnished with hairs, they are apt to fall out. The absorption of iodine, when it is applied to the skin, is supposed to be shown by its action upon glandular structures, causing them to diminish in size, and by the colic, diarrhœa, and dryness of the fauces which are reported to have been observed in some cases. It has, in fact, been generally believed that iodine produces its deleterious and also its curative effects upon the system, quite as certainly, though, perhaps, not so readily, by the external as by the internal mode of its administration.1 Recent experiments, however, throw great doubt upon the current opinion in relation to this subject. It was found by Braune that neither foot-baths containing forty-five grains of iodide of potassium in six quarts of water, nor frictions with iodine ointment upon the breast, abdomen, and back, produced the slightest trace of iodine in either the saliva or the urine.2 Dr. Murray Thomson, also, could find no trace of iodine in the urine after spreading over both feet and legs as high as the middle of the tibia a moderately thick coating of iodine ointment, which (we infer, for it is not so stated) was allowed to remain all night covered with cotton socks.3 If tincture of iodine is applied to the denuded cutis, as upon a blistered or ulcerated surface, it acts as a caustic, producing severe pain, and afterwards gastro-intestinal derangement. Bonnet has shown this to be true, and similar results (which he employed therapeutically) were obtained by Philippeaux.

On Mucous and Serous Membranes, &c. When tincture of iodine is applied to the denuded cutis, or to mucous membranes, its action is nearly the same as upon the skin, viz: it occasions smarting followed by contraction and dryness of the tissue, which is then protected from the air by a film of albumen mixed with iodine. If the application

¹ Med.-Chir. Rev., June, 1824, p. 105; also, Buchanan's Remarks, loc. cit.

² Viechow's Archiv., Marz, 1857, p. 295.

³ Edinb. Med. Jour., vii. 1024.

⁴ Gaz. Méd. de Paris, and Am. Jour. of Med. Sci., Oct. 1852, p. 495.

⁵ Bull. de Thérap., xliii. 19, 62.

starch. He analyzed the alvine dejections of a patient who was taking daily an ounce of this compound, containing thirty-six grains of iodine. They were natural in color, or even paler than usual, and did not contain a particle of iodine. The same experimenter having taken two drachms of the iodide of potassium, drew blood from his arm as soon as the salt appeared in his urine, and found both serum and crassamentum deeply impregnated with iodine.

The carefully conducted experiments of Dr. C. Handfield Jones, undertaken for the purpose of discovering, if possible, some uniform effects upon the urine from iodide of potassium, could determine none. It increased the urine or diminished it, rendered it sometimes more and sometimes less acid, and had an equally variable influence upon its proportion of chlorine, of urea, and of uric, sulphuric, and phos-

phoric acids.

The effects of iodine in small doses, but not long continued, may be inferred from the following experiments: Orfila took two grains of this substance, fasting. He found its taste extremely disagreeable, and was somewhat nauseated. The following day, on increasing the dose to four grains, a sense of heat and constriction in the throat was felt for a quarter of an hour, when vomiting of the iodine took place. The next day but one he took six grains of iodine, and, as before, immediately experienced heat and constriction of the throat, nausea, eructation, salivation, and epigastric pain. In ten minutes, copious bilious vomiting occurred. On the morrow, no effects of the medicine remained, except a slight feeling of lassitude.

The experiments of Jörg and his assistants offer more detailed results. They used a tincture containing one grain of iodine in ten drops of alcohol. Of this preparation, from one to five drops in half an ounce of water caused an irritation of the throat with a saltish taste in the mouth, and more or less oppression in breathing. The larger of the doses occasioned fugitive pains in the head, back, and arms, augmented appetite, and copious frothy stools, followed by constipation. Doses of from six to fifteen drops gave rise, in addition, to colic and borborygmi, hunger, thirst, watery stools; an increased flow of light-colored urine, of nasal mucus, and of saliva; transient malaise, tension of the head, and oppression of the chest. When the dose was raised to eighteen drops the symptoms were more marked, and besides those already enumerated, there was a diffused sense of heat, quickened pulse, sexual excitement, and a dry cough.

The experiments of Jörg led him to the following conclusions: Iodine irritates the alimentary canal, augmenting the salivary and pancreatic secretions, increasing hunger and thirst, and producing colic and diarrhoea. It also occasions pains in different parts of the head, and tends to develop irritation, congestion, and even inflammation of the lungs, augmenting at the same time the secretion of the nasal passages and the bronchia. It further excites the genito-urinary organs when its action attains its maximum or has been long continued about this effect is not constant.

tinued; but this effect is not constant.4

Lond. Med. Gaz., xviii. 517.

³ Toxicologie, 5ème éd., i. 100.

BEALE's Archives, i. 182.

⁴ Materialien, p. 473, &c.

those which are most distinctive and characteristic. If we are to accept the statements of certain writers, the medicine often acts as iron does, in appropriate cases, augmenting the appetite and strength, and the activity of all the functions, mental as well as bodily. Others, however, mention such effects as rare or as only secondary to the removal of the disease which the medicine was given to cure; while others still attribute to a slight excess in using it a peculiarly distressing depression of mind and body, amounting even to hypochondriasis. Finally, not a few have been unable to notice any phenomena attributable directly to iodine. We can only infer from this diversity of effect, that the apparent operation of the medicine is greatly influenced by the condition of the patient to whom it is administered.

The number of cases which have terminated fatally through the direct poisonous agency of iodine is very small indeed. Almost the only one in which death occurred within a week from the ingestion of the poison is that reported by Mr. J. H. Smith, of Sheffield. But in this example the patient, a woman, was laboring under erysipelas of The quantity taken was rather less than a drachm of iodine in an ounce of spirit. In other cases the symptoms have been a burning heat of the throat and stomach, retching and sometimes vomiting, severe griping pains, diarrhoea, general paleness, cold extremities and collapse, followed, in some instances, by redness of the skin, an active pulse, and other signs of reaction. Even such cases usually terminate favorably, or, if fatal, become so by exhaustion after the lapse of several weeks. In one reported by Nélaton symptoms such as have been described followed the injection of a diluted tincture of iodine into the cavity of an abscess of the thigh. A female patient of the same surgeon became affected with cedema of the glottis during the use of iodide of potassium. A similar, but fatal, case of the same accident occurred in the practice of Dr. Lawrie.

This preparation, even in moderate doses, has occasionally produced alarming symptoms. In one case reported by Dr. Lawrie the larynx was also the part affected, and the symptoms resembled those of spasmodic croup. There had been taken in all but seven and a half grains of the salt. In another case, where half a drachm had been administered in the course of four days, the patient complained of excruciating headache, and acute pain in the eyes, with profuse lachrymation.3 Dr. Horst relates the history of a man, who, after taking less than a grain of the iodide of potassium, complained of fulness of the head, giddiness, constriction of the throat and chest, dryness of the mouth, anxiety, tickling, cough, and trembling of the limbs in walking. These symptoms lasted an hour. The evening of the same day they returned on a second dose being taken, and on subsequent days, also, they recurred when the medicine was repeated. In the last case we suspect that the solution contained the cyanide rather than the iodide of potassium; and in the previous ones, it must be presumed that the

¹ TAYLOR on Poisons (1st Am. ed.), p. 249.

² Abeille Méd., x. 317. Lond. Med. Gaz., xxvi. 588.

⁴ Dierbach, Neueste Entdeck., iii. 980, where other cases will be found of unusual symptoms from apparently small doses of iodide of potassium.

phenomena, the following: a frequent pulse, palpitation of the heart, dry cough, sleeplessness, rapid emaciation and loss of strength, swelling of the legs, trembling of the limbs, nervousness of the movements, &c. Subsequent experience enables us to enlarge this catalogue considerably, which, however, is only to a small extent, and in rare cases,

descriptive of the effects of iodide of potassium.

Iodism is most conspicuously manifested by the alimentary canal. Digestion is impaired, and the appetite lost; the patient complains of an annoying and even a painful sensation in the throat and epigastrium, which ultimately becomes a fixed burning pain in the latter, and a distressing heat and dryness of the former. Watery diarrhoea ensues, with colic, and sometimes salivation, which in certain cases may be attributable to the revival of mercury in the system, conjunctivitis, coryza, nasal catarrh, and emaciation. The opinion has been entertained, that iodine produces emaciation by its stimulation of the absorbent system. Hence the loss of flesh usually proceeds faster in children than in adults. Graefe, of Berlin, employed iodine as "an emaciating agent," with complete success in a case of polysarcia.2 Cullerier has pointed out a probable explanation of the different results of observation in respect to this subject. He remarks that if the patient is in poor condition through the influence of a disease which iodine is capable of curing, he will increase in flesh with the progress of the cure. This writer cites from his own experience several cases which illustrate the tendency of iodine to produce atrophy of the testicles and the mammæ, and to diminish the mammary secretion.3 Other symptoms, referable to the nervous system, are produced by iodine; such as anxiety, palpitation of the heart, sleeplessness, painful dreams, headache, disordered vision and hearing, dulness of mind, and general debility. Occasionally there is tremulousness of the hands and of the arms and legs, and even convulsive attacks have been observed. Sir B. Brodie asserts that he has known iodine to cause paralysis. The following case illustrates in a striking manner this class of symptoms. The patient, a man of fifty-five years, was under treatment with iodide of potassium for an eruption of acne indurata. At first he experienced a painful burning sensation in the feet, then a trembling of the limbs and a feeling like intoxication. His movements were irregular and uncertain, and his expression haggard and dull; he became short sighted, and objects often appeared double or in rotatory motion. By degrees the muscles of the lips and cheeks became paralyzed, the gait staggering, and the articulation spasmodic, or jerking. In some cases preparations of iodine affect the skin and even the hair, rendering their color darker. More commonly there is a tendency to copious perspiration and to eruptions of urticaria, impetigo, prurigo, lichen, eczema, or furuncles. In some cases also ecchymosis or purpura of the inferior extremities has been observed. Anæsthesia of the skin from the local application of tincture of iodine

OESTERLEN, Heilmittellehre, 4te Aufl., p. 278.

^{*} Hosson, Trans. N. York Med. Soc., ii. 299, and Brit. and For. Med. Rev., v. 164. Revue Méd., cii. 603, &c. Dierbach, Neueste Entdeck., iii. 975.

Bevue Méd., civ. 568.

convenience, we shall consider at the same time the uses of iodine in solution, and of its several preparations, it cannot be denied that in many cases one of these may have a decided advantage over another. It has been seen that iodide of potassium is very rapidly eliminated from the system, very much more so than iodine itself; wherefore it is probable that the latter is to be preferred whenever it is intended to modify the living and normal elements of the economy, but that the former should be employed whenever the elimination of some effete, imperfectly organized, or abnormal material is the object to be accomplished. The relative values of solution of iodine and of the iodide of potassium has not been fully ascertained. The facility with which the latter is supported, and the completeness with which it performs some of its remedial offices, have perhaps led prematurely to the neglect of the less agreeable preparation, and it may be well for those who employ them to bear in mind that one may succeed where the other has failed.

Mercurial Salivation. In 1832, Knod v. Helmenstreit, of Aschaffenberg, in several cases, successfully made use of the tincture of iodine internally, to combat mercurial ulceration of the mouth. In the following year this method was employed by Kluge, of Berlin, who effected a cure, in seventeen cases, in the course of from three to twelve days. Many other physicians were equally successful, and among them Dr. Jaurin, of the Canary Isles, and Aran, of Paris. It is to be remarked that iodide of potassium has not always been found to possess the same virtue which is here ascribed to iodine. Dr. Laycock assures us that, given in ptyalism, it seems to have the effect of increasing the discharge; and Hacker, of Leipzig, relates four cases in which a solution resembling Lugol's rather aggravated mercurial ulceration of the mouth. But this untoward result is probably exceptional. Dr. Corson, of New York, has published several cases which prove the iodide to have been in his hands a prompt and certain cure for mercurial ptyalism.

Elimination of Mercury and Lead. The earliest suggestion of the power of iodide of potassium to cure chronic poisoning by lead or mercury was made by MM. Guillot and Melsens to the French Academy of Sciences in 1844. The more complete results of the latter were published in 1849. In them, says his translator, Dr. Budd, it is assumed, no doubt rightly, that the metallic substance is in actual union with the affected parts, and is there retained as an insoluble compound. The iodide of potassium sets it free by rendering it soluble, and thus enables it to escape from the system, by the kidneys especially. That the saline solution liberates the metal lying dormant in the tissues, appears to be proved conclusively by the fact that, on the administration of the former, symptoms arise which are peculiar to the metal with which the system is impregnated, and this is proved

DIBRBACH, Neueste Entdeck., i. 430, and ii. 1010.

² Bull. de Thérap., xli. 234. ³ Ibid., xliv. 268.

⁴ Lond. Med. Gaz., 1839, xxiii. 823.

⁶ N. Y. Jour. of Med., Sept. 1853, p. 243. Archives Gén., 4ème 86r., iv. 517.

⁷ Annales de Chimie, Juin, 1849; Brit. and For. Med.-Chir. Rev., Jan. 1853, p. 201.

which had proved intractable to other medicines. Dr. Clendenning soon afterwards published a number of cases illustrating its value in the affection referred to.2 But more general attention was attracted to the subject by Dr. Wallace, of Dublin, whose large experience left no doubt in regard to the efficacy of the medicine.3 Finally, its peculiar power of curing deep-seated syphilitic diseases of the integuments, cellular tissue, and bones, was established in the confidence of the medical profession by M. Ricord. Mercury is incompetent to cure the tertiary symptoms of syphilis, and, indeed, so often aggravates them, that they have been regarded by some persons as effects of chronic mercurial rather than of syphilitic poisoning. However this may be, such symptoms are curable by the iodide of potassium more frequently, and with more certainty, than by any other remedy. It is also useful in the transition from the second to the third stage of syphilis, particularly when the system is impaired, and phagedenic or gangrenous ulcers attack the throat, and ecthyma or rupia appears upon the skin. When given to cure the appropriate symptoms, says Ricord, a marked and decided improvement rarely fails to appear during the second week of the treatment, and sometimes sooner. The tubercles are absorbed, the ulcers become clean, the suppuration diminishes, the osteocopic pains cease, and the osseous tumors, if they are not permanently indurated, soon begin to take on resolution.

At the London Ophthalmic Hospital this remedy is said to have been used with as much success as mercury in the cure of syphilitic iritis; but the reporter does not state whether or not the patients who were cured had or had not previously taken mercurials. A subsequent report from the same Institution renders it probable that the medicine is most successful when mercury has previously been taken, although it is often of itself sufficient for the cure. It should be borne in mind that various affections not strictly belonging to the category of constitutional syphilis, may, nevertheless, derive their gravity and peculiar type from syphilitic infection. Such are rapidly curable by the iodide of potassium. The most important are paralytic disorders;

others affect the lungs.

The modus operandi of iodide of potassium in curing constitutional syphilis presents an extremely interesting problem. Although the question cannot be considered as thoroughly solved, the following observations render it highly probable that the medicine is chiefly curative by virtue of its power of liberating the mercury which an antecedent mercurial treatment has accumulated in the system. This explanation was originally proposed by MM. Melsens and Guillot, and, as already stated, was founded upon their experiments and observations previous to 1844. Several years afterwards, the former of these gentlemen published an essay, in which, by a variety of proofs, he showed

Lond. Med. Gaz., xiv. 41.

* Ibid., xv. 833 and 866.

<sup>Lancet, Feb. 1836, p. 743, and March, 1836, p. 5.
Bull. de Thérap. (1839), xvii 21.</sup>

^{*} Times and Gaz., July, 1854, p. 11.

* Ibid., May, 1859, p. 546.

* Bouchardat, Annuaire de Thérap, 1845, p. 168.

⁸ Annales de Chimie, Juin, 1849; Brit. and For. Med.-Chir. Rev., Jan. 1853, p. 201.

latter these remedies have never been used. The same writer, speaking of simple chronic rheumatism, states that no benefit is derived from iodide of potassium, unless mercury has previously been admi-Besides these and many analogous conclusions of clinical experience, we find, as in the results obtained by M. Melsens, that direct experiment favors the belief that iodide of potassium is useful in tertiary syphilis chiefly by reviving the mercury lying dormant in the tissues. It appears to be highly probable, also, that its salutary influence is derived in part, at least, from the state of minute division in which the mercury exists, and the increased facility it thence de-

rives for penetrating the ultimate elements of the tissues.

Yet it must not be supposed that iodide of potassium is incompetent to cure tertiary syphilis without the intervention of mercury. Ricord has emphatically pronounced this notion a mistaken one, although he believes that a previous mercurial course is best fitted to secure the favorable action of the salt. It has also been proved erroneous by Dr. Hassing, of Stockholm. He treated with iodide of potassium 125 cases of tertiary syphilis in patients who had previously taken mercury, and 70 cases in those who had not done so. Among the former cases, 29 resisted the treatment, and of the latter 21; so that although the proportion of cures was greater in the first class, yet it did not greatly exceed that obtained in the second. M. Rodet, of Lyons, it may also be remarked, maintains that iodide of potassium is most efficacious when no other treatment has preceded it. He even affirms that a previous mercurial course is often productive of unpleasant symptoms (iodism), and that iodic preparations sometimes occasion formidable lesions when mercury has been taken shortly before. This experience is certainly singular, unless it be taken as an imperfect representation of the effects observed by Budd and Melsens, and as attributable to the revival of the mercury by the iodine.

Hypertrophied Organs. The influence of iodine upon the function of nutrition is strikingly illustrated by its efficacy in the cure of hypertrophy, and the removal of unorganized deposits. Indeed, as is well known, the virtues of iodine were earliest recognized in one of this class of affections, viz., in goitre. In many cases of simple chronic enlargement of glandular organs, e. g., of the mamma, the testes, the liver, the spleen, and the prostate gland, iodine appears to have exerted a very salutary influence, whether employed internally or topically. It may be presumed that its operation is most manifest in proportion as the increased size of an organ depends upon nutritive rather than inflammatory action, although it sometimes acts in the latter case with very happy effects. It has been used to diminish the size of the mamma when hypertrophied. It has also been proposed as a means of diminishing the size of the fœtus in utero in cases of contracted pelvis. Excessive corpulence has also been reduced by

its operation.

In goitre its virtues are most signally displayed. But, as Rampold

Révue Méd., ciii. 459.

¹ Lectures, 1849, Am. ed., p. 276.

² Brit. and For. Med.-Chir. Rev., Oct. 1845, p. 384.

for scrofula, as really as cinchona is for ague, or mercury for syphilis, experience has shown his estimate to be an exaggerated one. Some have even gone so far as to attribute all of the improvement which notoriously took place in many of his patients at the St. Louis Hospital, to the good food and the comfortable lodgings which many of them then enjoyed for the first time in their lives. Certain it is that in private practice a similar degree of success has seldom been obtained.

In the most common and the earliest form of scrofula, glandular enlargement, two elements are frequently combined, the hypertrophic and the tubercular. Under the influence of iodine, the former may be entirely removed, but it is doubtful whether the latter is ever really At an advanced stage of the disease, when softening of enlarged glands and ulceration of the integuments have taken place, iodine will frequently promote the healing of the ulcers, while it improves the general health in a marked degree. Even in scrofulous enlargements of the articulations depending partly upon thickening of the fibrous coverings and partly upon effusion within the synovial capsule, this medicine, externally as well as internally, exerts a decidedly curative influence, especially when associated with cod-liver oil. It is also capable of producing a marked amelioration of caries of the bones, and sometimes it effects a complete and permanent cure. It is prudent in all such cases not to make use of iodine, so long as an inflammatory action predominates; if then employed, it tends to induce suppuration of the enlarged glands, and to excite inflammation in other diseased structures. It is true that the suppuration is generally of a more acute form, and terminates more rapidly in cure than that which tends to arise spontaneously, and probably would so arise in the part affected. Tabes mesenterica, although generally a fatal disease, is probably in some cases susceptible of cure. This would appear to be proven by Rilliet and Barthez, who found the mesenteric glands converted into cretaceous masses. A number of cases, also, collected by Boinet, seem to show that the removal of the disease occasionally takes place under a plan of treatment of which iodine forms the principal part. But in this, as in all other scrofulous affections, the association of iron and cod-liver oil with iodine greatly enhances the probability of cure. To be successful, also, the treatment must be continued for a long time after the disappearance of the local disease. For scrofula is eminently a constitutional affection, and it is only by a well devised and steadily pursued regimen, both dietetic and medicinal, that it can be kept in abeyance. It is in this disease that Boinet especially recommends his iodized food, consisting of bread, gingerbread, cakes, biscuits, chocolate, wine, beer, &c., made with natural products yielding iodine, such as fuci, marine plants, cruciferæ, salts containing iodine, and some mineral waters holding this substance in solution.1

Scirrhus and Cancer. The great difficulty of distinguishing the true

Bull. de l'Acad. de Méd., xxiii., 1182. For an illustrative case, vid. Brit. and For. Med.-Chir. Rev., July, 1859, p. 244.

wards, Sir Charles Scudamore, eulogized the efficacy of its vapors in consumption. The last-named physician employed inhalations of the vapor from a solution composed as follows: Iodine and iodide of potassium, of each six grains; distilled water, five ounces and six drachms; alcohol, two drachms. A drachm of this mixture, with thirty minims of a saturated tincture of conium, or when there was spasmodic cough, some ethereal tincture of lobelia, was directed to be mixed in an inhaler half full of water at 120° F., and inhaled for ten, fifteen, or twenty minutes. It is important that the tubes be of large calibre, and the quantity of the solution be gradually increased. This treatment was only intended to be an auxiliary to the approved remedies in consumption, but it was found well fitted to allay the cough, diminish the bronchial secretion, and favor the efforts of nature in cases where a suspension of the disease tends to take place.

More recently, M. Piorry, of Paris, without any reference to the earlier trials and comparative failure of iodine inhalations, has vaunted his success in their use.2 His patients were made to breathe in a wide-mouthed jar containing either a scruple of iodine, or some of the tincture, the vapors of which were disengaged by heat. They were, moreover, obliged to sleep in an apartment in which iodine was exposed to the air. The majority of them took from twenty to sixty grains of the iodide of potassium daily, and were kept upon a very nutritious diet. The ultimate results claimed for this method were, decided improvement in the symptoms and anatomical characters in twenty consumptive patients; disappearance of the physical signs and most of the symptoms in seven cases; death without improvement in four. M. Piorry believes that iodine causes the induration around the tuberculous deposit to diminish, that it probably may favor the removal of tubercles, and that it promotes the healing of cavities. We do not learn that results so strikingly favorable have been obtained by other physicians, although many have made iodine inhalations the subject of a special study. They probably have never cured tubercular phthisis, although they frequently diminish the bronchitis which complicates and aggravates it. The deposit of tubercle takes place from within, and if it is to be prevented, the prophylactic agent must be applied through the blood. If the disease is to be cured, the remedy must, in like manner, approach it upon the side, where alone it can be subjected to vital operations.

Iodide of iron has been much used in the treatment of phthisis. It is a convenient form under which to exhibit ferruginous preparations in this disease, which is so often marked by an extreme degree of anæmia, but there is no evidence whatever of its superiority to other medicines of the same class. It has been attempted to bring cod-liver oil into the list of iodic remedies, although this product contains a proportion of iodine not exceeding the one-two-thousandth part. If it is efficacious in the cure of consumption, assuredly it is not to this infinitesimal quantity of iodine that its virtues are owing.

¹ Lancet, June, 1841, p. 492.

² Comptes Rendus, Jan. 1854, and RANKING's Abs. (Am. ed.), xx. 70.

what was already accomplished. M. Bourrousse claims to have cured eight cases of this disease by doses of about five grains of the iodide alone repeated every three or four hours from the first development of the attack.'

In general anasarca independent of organic disease, iodide of potassium is often serviceable. In 1835, Coster published several examples of its success. Osborne cured this affection by means of frictions with a liniment composed of tincture of iodine, soap liniment, and oil of turpentine; and Graves spoke of the administration of the iodide of potassium with the greatest confidence. In some cases of ovarian dropsy it was successful when used by Gairdner and by Baron, and Dr. Thomson says that in two instances he used it after paracentesis with advantage, but adds that his hopes of its utility had not been realized. It is said to have cured ædema of the glottis arising from syphilis. Dr. Sieveking speaks of the eliminative power which it appears to exert in cases of cerebral apoplexy after the acute symptoms have subsided.

Rheumatism. In muscular rheumatism iodide of potassium is often extremely serviceable after the acute symptoms have subsided. It is of comparatively little use in acute articular rheumatism, although cases cured by its means have been reported by Campbell, Weber, and Oulmont, but in the chronic form, the more exclusively the fibrous tissue is affected, whether of the joints or of the middle of the bones, the more favorably does the remedy operate. When the periosteum is implicated, it gives speedy relief, and not unfrequently removes the pain and swelling in the course of a few days. Indeed, so potent is the medicine over this particular form of the disease, that in many instances the cure may be safely intrusted to its unassisted power.7 On the other hand, when the joints themselves are enlarged, their fibrous investments thickened, and their movements painful, the compound tincture of iodine is said to be preferable to the saline preparation. Several cases of that form of rheumatism which Sydenham described, and which Haygarth termed "nodosity of the joints," a disease generally regarded as incurable, have been restored to health by Dr. Laségue.10 He treated them with iodide of potassium without any benefit whatever, but found that improvement began and advanced steadily under the use of the compound tincture of iodine. The medicine was prescribed in doses of ten drops, diluted with water or weak wine and water, and taken at or after breakfast and dinner. of the success of this treatment in the hands of M. Gintrac has been published.11 It has also been lauded by M. Trousseau.12 In a very inveterate case of the disease we tried it perseveringly without the slightest benefit.

In chronic gout iodide of potassium has frequently been used with

Bull. de Thérap., lxi. 185.

Clinical Medicine, p. 541.

⁵ Dublin Hosp. Gaz., Feb. 1858.

⁷ Fuller, on Rheumatism (Am. ed.), p. 298.

Works, Syden. Soc. ed., i. 255.

¹¹ Bull. de Thérap., liv. 187.

² Bull. de Thérap., vii. 51.

⁴ Times and Gaz., March, 1857, p. 300.

Bull. de Thérap., liv. 325.

BBLIOUX, Bull. de Thérap., xlix. 241.

¹⁰ Archives Gén., Sept. 1856, p. 300.

Abeille Méd., xviii. 446.

perfect cure.' In chorea, affecting persons tainted by syphilis or scro-

fula, it has also proved useful.

Iodide of potassium has been employed to moderate excessive lactation. Rieseberg relates the case of a woman who, owing to deformity of the nipples, was unable to suckle her children, but whose milk nevertheless continued to be secreted profusely. This occurred in her second and also in her third confinement, and on both occasions the secretion was arrested by the internal use of the compound solution of iodine. M. Rousset, of Bordeaux, has published twenty cases intended to demonstrate this virtue in the medicine, when given to the extent of eight or ten grains, in divided doses, in the course of the day.3 In the vomiting of pregnancy iodine appears to be a remarkably successful remedy. Dr. Schmitt, by administering two drops of the tincture every two hours, to a woman, who, in consequence of vomiting, had had four abortions, enabled her to complete her fifth pregnancy securely; and Dr. Eulenberg succeeded in relieving one who had become very much reduced by vomiting during gestation, by giving her, every three hours, three drops of a solution of a scruple of tincture of iodine in three drachms of alcohol.4 M. Becquerel and M. Buisson used for the same purpose one part, by weight, of tincture of iodine, and one and a half parts of iodide of potassium, dissolved in thirty parts of water, of which a tablespoonful, diluted in a glass of sweetened water, was directed to be taken in three doses during the day. M. Buisson has reported three examples of its complete success.* Dr. Masson also mentions five cases in which he succeeded in arresting this distressing and dangerous symptom, by administering, every morning in a glass of sweetened water, three drops of a mixture of one part of tincture of iodine with five and a half parts of alcohol. Salivation during pregnancy has been arrested by the use of pastilles, each containing a grain of iodide of potassium.7

Strumpf states that it is of "unquestionable advantage" in cases of barrenness and inability to procreate, probably when this condition depends upon general debility. When amenorrhæa occurs under similar circumstances, iodine is sometimes of service; in this affection and in dysmenorrhæa it was originally recommended by Coindet, particularly where general debility and a strumous habit existed. Under like conditions of the general health it is useful as a remedy in leucorrhæa; but in all of these cases it should be associated with iron.

Friedrich, of Leipsic, gives a summary of nine cases of ulcerative stomatitis occurring in scrofulous persons, and cured by a solution containing one and a half grains of iodine, and three grains of iodide of potassium, to four ounces of water. Iodine has also been given with advantage in cases of ozena, probably of syphilitic origin.

Topical Application of Iodine.—Like other substances endowed with an irritant action, iodine is employed as a substitutive and also

TAYLOR, Times and Gaz., July, 1863, p. 37. Bount, op. cit., p. 782.

Bull. de Thérap., lv. 38; Times and Gaz., Oct. 1863, p. 365.

Times and Gaz., Nov. 1856, p. 527.
 Abeille Méd., xiv. 268.
 Bull. de Thérap., liii. 474.
 Bull. de Thérap., liii. 238.

⁸ Handbuch, ii. 692.

9 Dierbach, op. cit., ii. 1015.

In various diseases of the skin iodine has been employed with occasional success, both internally and locally, but, except in those which depend upon constitutional syphilis, its virtues have not been very clearly exhibited. Doubtless it may in both modes occasionally cure psoriasis, herpes, acne, and even favus, but none of them as certainly or as speedily as other remedies. Hebra declares that its internal administration is nugatory in all non-syphilitic diseases of the skin. With lupus the case is somewhat different. This is an affection generally engrafted upon a scrofulous constitution, and on that account, probably, is more amenable to the internal administration of iodine than the other cutaneous diseases mentioned. To obtain its full benefits, however, the remedy must be continued for a long time, and in very moderate doses, not exceeding a grain, two or three times a day. As an external remedy in lupus, the tincture of iodine is too feeble to be of much service. A solution of one part each of iodine and iodide of potassium in two parts of glycerin forms an active caustic which may be very advantageously used in the treatment of lupus and other obstinate local degenerations of the skin. An ointment made by melting together one part of sulphur and two of iodine, and mixing with one part of this compound eight parts of lard, is recommended by Hebra as a superficial caustic in acne rosacea, sycosis, &c. It should be applied as a plaster and renewed morning and evening according to the degree of its operation. The tincture has sometimes been found successful as an application for the cure of warts, soft corns,' and vascular nævi. A solution of iodide of potassium may be used to remove stains produced by nitrate of silver. The stain should be moistened thoroughly with the solution, and exposed to the sun.

Various mucous fluxes have been cured by the local application of the tincture or the solution of iodine. Lugol employed the latter, when diluted, as an injection into the nostrils in ozæna. laryngitis may be treated advantageously by iodine inhalations, and by tincture of iodine applied to the skin of the fore part of the neck. The same means should be tried in aphonia, arising either from debility and relaxation, or from chronic thickening of the laryngeal mucous M. Ancelon found the application of tincture of iodine membrane.2 to the pharynx, by means of a probang, very efficient in overcoming spasm of the esophagus.3 In leucorrheea it has been successful when applied thoroughly, by means of a mop and speculum, to the whole vaginal surface and os uteri. Dr. Russell, of Louisiana, states that he used a solution containing from one to four grains of iodine, with double the quantity of iodide of potassium, in an ounce of water, as an injection, with better effects than those obtained from the nitrate of silver. A similar treatment has been found successful in the cure of Two drachms of tincture of iodine in an ounce of water form a solution which should be injected night and morning for several Boinet cured several cases of chronic catarrh of the bladder by days.

4 N. Y. Jour. of Med., April, 1854, p. 395.

Bull. de Thérap., lv. 92.

Bull. de Thérap., lv. 141. * Bennert, Times and Gaz., Jan 1858, pp. 116, 138.

until iodine ointment was applied to a blistered surface upon the affected side of the chest.¹ The same effect has followed painting the skin with tincture of iodine.² This latter method has also been used with advantage to relieve pleuritic stitches. Norris, of Edinburgh, employed it in puerperal peritonitis,¹ and others have, with more probability of advantage, used it in the chronic forms of peritoneal inflammation occurring in strumous subjects. It is likewise serviceable in hydrarthrosis, or fluid effusion within the joints, and in all cases of fibrinous exudation, whether involving the articular ligaments or the periosteum only. In all cases in which the skin is unbroken, the iodine probably acts as a counter-irritant, and is not absorbed.

Dr. Brainard, of Chicago, has proposed iodine as a means of neutralizing animal poisons introduced into wounds, whether those of venomous animals, or the products of animal decomposition. The latter application of iodine has been illustrated by M. Boinet, in the treatment of gangrenous and ill-conditioned suppurating cavities, to prevent purulent absorption and its consequences. It appears that iodine has the property of disinfecting the secretions of such diseased surfaces, while by its coagulating action upon the fluids in the substance of the walls of abscesses, it erects a physical barrier to absorption. When a virus such as that of the mad dog, of glanders, or of a venomous animal is inoculated, the application should be made immediately, and a large cupping-glass retained for some time over the wound. Dr. Brainard recommends, in addition, the injection of a solution of iodine into the cellular tissue around the wound. physician has also injected a solution of iodide of potassium into the subcutaneous cellular tissue for the removal of serous and fibrinous effusions, as in cedematous erysipelas.

Injection into Serous Cavities. It has been already stated that iodine, although an irritant, does not excite suppuration unless a very strong solution of it is employed, but only occasions an adhesive inflammation. This singular property has been applied to the treatment of various forms of dropsy. It was first employed in 1832, by Martin, of Calcutta, for the radical cure of hydrocele, and speedily became the ordinary method. A mixture of one part tincture of iodine with two parts of water is thrown into the cavity of the tunica vaginalis after the evacuation of its serum, and is allowed to remain for five or six minutes. It seldom occasions pain unless the part is compressed, but some fever usually follows, and continues for several days. The result is nearly always a successful one, if the operation has been performed with care. In eleven hundred and forty-eight cases treated with iodine injections, only three failed; and these injections succeeded in nine cases where the previous use of port wine and sulphate of zinc had proved ineffectual.

A similar injection has been used to cause obliteration of the sac in reducible hernia, and thus to prevent a recurrence of the accident.

¹ Bull. de Thérap., xliv. 88.

⁸ M. VAULPRÉ reports five cases of its complete success. Bull. de Thérap., lii. 80.

[•] South's Chelius (Am. ed.), iii. 227.

Roux, the patient died three months afterwards of typhoid fever, when extensive adhesion of the intestines was found, and the free portion of the peritoneal membrane was of a slate color, and had a metallic lustre.¹

Injecting the pleural cavity for the cure of chronic pleurisy is an ancient practice. Simple puncture of the thorax is generally successful when the distending liquid in serous, and as generally fatal when it is purulent, but in the latter case the issue can often be rendered favorable by the use of stimulating injections, and especially of those containing iodine. For this method we are indebted to M. Boinet, who attributes to it the following advantages: it corrects at once the fetor of the pus, and so modifies the condition of the pleural surfaces as to render a cure possible even in cases supposed to be necessarily mortal. His mode of procedure is to evacuate the pus very gradually during a period of several days, then to wash out the chest with thin mucilage, and immediately afterwards to inject the iodized solution. This should be very weak if the case is a recent one, e. g., four or five grains of iodine, and as many of iodide of potassium, in a pint of water. But much stronger solutions have sometimes been used, e. g., one part of the compound tincture of iodine to ten of water, or even, as in a case of M. Aran, one part of iodine to two of water, with the addition of iodide of potassium. In this case, which terminated in cure with retraction of the side, the constitutional effects of iodine were evident. The injections ought to be repeated every third or fourth day according to the changes produced in the discharge, and in quantity they should be proportioned to the size of the pleural cavity. A very interesting instance of the perfect success of this method is reported by Dr. Brainard. The patient was a boy, sixteen years of age, and the empyema followed a pleurisy, caused by a wound with a knife. A solution consisting of one grain of iodine, three grains of iodide of potassium, and an ounce of water was injected, twice a day.3

Dr. Brainard was the first to propose and make use of injections of iodine for the cure of spina bifida, or more correctly, of hydrorachis. His patient was a girl thirteen years of age, partially paralytic in the lower extremities, and idiotic. She had a fluctuating tumor over the sacrum three inches in diameter. Into this was injected, without evacuating it, a drachm of water holding in solution one grain of iodide of potassium and half a grain of iodine. Diminution of the tumor followed. A second operation of the same sort was performed three weeks afterwards, and the swelling continued to subside. From the result of this and other cases, Dr. B. regards hydrorachis as generally in itself a curable disease; but its complications may render the operation by injection, or any other operation, inexpedient or even fatal. Cases have also been operated upon by Chassaignac and by

¹ Archives Gén., Oct. 1855, p. 479. A case of cure of inveterate ascites by this treatment is recorded Brit. and For. Med.-Chir. Rev., Jan. 1862, p. 232.

Buil. de Thérap., xliv. 54.
 Am. Jour. of Med. Sci., July, 1858, p. 289.

⁴ Ibid., July, 1848, p. 262.

⁵ Ibid., Oct. 1850, p. 560; Oct. 1860, p. 572; July, 1861, p. 65.

organic complications, are more readily cured than old, multilocular cysts, &c. Probably few multilocular cysts, or any but simple serous cysts are curable by this method.

"7. Sometimes a serous cyst, even when very large, is cured by a

single injection, but generally more are required.

"8. The injections should be repeated until the cyst is completely obliterated.

"9. It is important to operate as soon as liquid can be detected, and to renew the operation if the cyst re-forms.

"10. The strength of the injection must be modified according to the extent and nature of the cyst, its complications, and peculiarities.

"11. The puncture should be made above Poupart's ligament, and not through the vagina.

"12. It should always be made on the side where the tumor originated."

It is proper also to call particular attention to the remarkable success obtained by the physician above referred to, in applying the same treatment to all kinds of suppurating cavities, especially those which are inaccessible to the stimulants commonly employed to promote the cure of superficial ulcers. Such are lumbar and iliac abscesses, cold abscesses, white swelling, fistulæ of the larynx, of the anus, &c. In regard to fistulæ in ano, M. Boinet draws the following conclusions from his experience, viz., that iodized injections cure them more speedily and with less danger and annoyance than any other method; for they are less painful, easier to make use of, do not require the patient to keep his bed for a long time, are applicable to all cases, and especially to those which are unsuitable for an operation; and even if they should fail, the knife remains as a last resort. The same physician has reported cures of cysts of the liver by the method here recommended.

Modus Operandi.—If, in order to determine the nature of the curative influence exercised by iodine, we survey the whole field in which this substance and its compounds operate therapeutically, we are struck by the fact that, like other alteratives, its operation is gradual and usually unaccompanied by active phenomena. In dropsy of the great cavities, or of the joints, it appears to effect a cure by a very slow and steady removal of the effusion, and without augmenting in a notable degree, the urine, the perspiration, or the alvine discharges. The same is true in reference to such tumors (simple enlargement of the thyroid body, of the ovaries, the testes, &c.), inflammatory or otherwise, which it is competent to cure. If we turn to other diseases in which its action is useful, such as metallic poisoning, tertiary syphilis, and certain cutaneous eruptions, we find in the first, material

¹ Numerous examples of this operation have recently been published, and among them the reader will find it of interest to refer to the following: Mr. Hardwick, Times and Gaz., Jan. 1857, pp. 110 and 138; Dr. S. Beck. Ibid., May, 1857, p. 498; Mr. Erichsen, Lancet, May, 1857, p. 452; Dr. B. Roemer, Am. Jour. of Med. Sci., Apr. 1857, p. 332; Mr. J. B. Brown, Times and Gaz., Dec. 1857, p. 587; Mr. Hutchinson, Ibid., June, 1858, p. 602; Mr. Bickersteth, Ibid., p. 655; Dr. Savage, Ibid., May, 1859, p. 548; Dr. D. G. Thomas; Trans. N. Y. State Med. Soc., 1863, p. 258.

² Op. cit., p. 608.

BROMINIUM.—BROMINE.

POTASSII BROMIDUM.—Bromide of Potassium.

HISTORY AND DESCRIPTION.—Bromine is an elementary substance obtained from bittern, the mother liquor of sea-water, from which chloride of sodium has been separated by crystallization. It exists in many marine plants and molluscous animals, and in the water of numerous saline lakes and springs. It was first isolated by Balard,

of Montpellier, in 1826.

At ordinary temperatures bromine is a very thin and volatile liquid of a dark brownish-red color by reflected light; but a thin layer of it is transparent and of a beautiful ruby red color. Its sp. gr. is 2.966. Its odor is strong, pungent, and offensive (hence its name, from βρώμος, a stink), and its taste astringent, acrid, and burning. Its vapor is not inflammable, and a lighted taper introduced into it is extinguished after becoming red at the upper and green at the lower part. It combines with water forming a hydrate, and dissolves in an excess of water, also in alcohol and in ether. It destroys the color of litmus and indigo, and neutralizes organic odors. It corrodes wood, cork, and other organic substances; turns a solution of starch orange yellow, and stains the skin of a similar color, which remains until the cuticle exfoliates. It coagulates albumen, losing its color. Fibrin is converted by its watery solution into a bluish gelatinous mass. disintegrates the red corpuscles of the blood, rendering the mass olive green at first and afterwards gray. It combines both with organic and inorganic substances. In medicine it has been used in combination with iron, mercury, ammonium, sodium, and potassium. The last only is officinal.

Bromide of potassium is prepared by adding a solution of pure carbonate of potassa to a solution of bromide of iron. The iron is precipitated, and bromide of potassium remains in solution, from which it is obtained by evaporating the liquid. It forms white, pearly, transparent crystals. They are without smell, and have a sharp, saline taste resembling that of common salt, but more pungent. They are unchanged by exposure to the air, and crepitate when heated. Bromide of potassium is wholly soluble in water, but is sparingly soluble in alcohol. It is decomposed by the stronger acids. When mixed with starch and treated with sulphuric acid it becomes yellow. When the urine of a person taking it is treated in the same manner a characteristic brown color is devoloped.

ACTION. On Animals.—The experiments of Höring and of Glover's show that the effects of bromine are partly due to its direct local action and partly to its absorption. When dogs were confined in an atmosphere filled with the vapor of this substance it excited a profuse secretion from the eyes, nostrils, and fauces, with cough, hoarseness, and dyspnæa. Upon the stomach it acted as a corrosive irritant, producing

STRUMPF, Handbuch, ii. 811; Monthly Jour. of Med. Sci., Aug. 1842, p. 709.

the abdomen moved gradually lower down. There was no loss of consciousness whatever. Death by collapse took place seven hours and a half after the poison had been swallowed. The mucous membrane of the stomach was found highly injected, and softened, and ecchymosed in spots, and was covered with a black deposit resembling coarse tanned leather. Similar appearances were presented by the duodenum. The peritoneum was highly injected in its upper half, and tinged of a reddish yellow.

Bromide of potassium was administered by M. Puche in daily quantities gradually increased from thirty to ninety grains, and which afterwards reached a maximum of three hundred grains. The first effect observed was headache with mental confusion, a certain appearance of intoxication with impaired sight and hearing such as frequently occur in typhoid fever. At the same time the patient manifested some debility of the lower extremities, and his step was tremulous and ill assured. This phenomenon was probably due to the impaired sensibility of the limbs, which was so decided that pinching and even burning the skin did not occasion pain. It was, however, unusual, and produced only by excessive doses of the medicine. Much more commonly, and indeed constantly, the sensibility of the mouth and fauces was impaired to such a degree that their reflex actions were not excited by titillation, and a similar insensibility sometimes affected the ocular conjunctiva. In general, also, the genito-urinary organs partook of this condition, and men of vigorous constitution accustomed to daily erections of the penis, found. that they ceased while taking the medicine, and for several days, even, after its use had been discontinued.2

Moderate or ordinary medicinal doses, such as from three to ten grains three times a day, may be continued for an indefinite period without producing any toxical symptoms whatever. In one case Williams gave five grains three times a day for more than a year, and in another for six months, and in a third case ten grains at similar intervals, without any but beneficial effects. Indeed, the doses of this medicine usually required in the treatment of disease, display no effects which are not consistent with a proper physiological operation, and hence it is justly entitled to be classed as an alterative. A partial exception to this statement is the fact that it sometimes increases the secretion of urine. Unlike other alteratives, it acts principally on the nervous system, and next to it on the function of nutrition. Whether the latter is an effect of the former, or a primary consequence of changes in the blood, is uncertain. The influence of the nervous system upon nutrition has been shown by recent researches to be much greater than was formerly supposed; but the laws which regulate it are not yet firmly enough established, to enable us to determine whether, in a case like the present, a milder action, but one similar in kind to that of poisonous doses of the medicine, may not precede the modification of nutrition which constitutes the most palpable among the phenomena of its remedial operation.

¹ Snell, New York Jour. of Med., N. S., v. 170; 340.

² TROUSSEAU and Pidoux, Thérap., 5ème éd., i. 279.

curative action whatever upon constitutional syphilis. Its palliative influence has been illustrated by a number of competent observers, but this it evidently owes to its anæsthetic or indirect narcotic power, which has been illustrated at the commencement of this article. every case of epilepsy there must be a source of irritation which excites the spinal centre, and through it, convulsive muscular action, by a reflex influence. This operation bromide of potassium moderates or suspends. It is not epilepsy alone among spasmodic diseases, which is more or less under the control of this medicine. Infantile convulsions, which it also has the power of preventing, and hooping-cough, which it moderates, as we have already shown, are in all probability mitigated, as well as epilepsy, by the singular sedative action of this salt upon the nervous organs of the motor power. In this manner, undoubtedly, it calms irritation and allays nervous excitability, and, better than any opiate medicine, gives sleep to the weary but agitated and over stimulated man of business, or the overtasked student.2 This sedative, or rather narcotic, action on the spinal marrow is still more strikingly illustrated by the manner in which it lowers the functions of the generative organs, and has thus been found one of the most efficient sedatives of morbid genital excitement, chordee, satyriasis, and nymphomania, spermatorrhæa, and other forms of reflex irritation of these parts. In all of the nervous affections which have been referred to as more or less under the control of bromide of potassium, its operation is essentially palliative and not curative. As soon as the medicine is suspended the symptoms which it relieved return, unless, meanwhile, a cure has been wrought by other means. In other words, its relation to the affections in question is precisely that of many narcotic or antispasmodic medicines, whose value consists not in eradicating disease but in repressing the development of its phenomena.

ADMINISTRATION.—Bromine is now never administered internally, because the bromide of potassium is more convenient and agreeable. The dose of this salt is from three to ten grains or more, and may be

repeated, if necessary, several times a day.

OLEUM MORRHUÆ.-Cod-LIVER OIL.

DESCRIPTION.—Cod-liver oil is obtained from the livers of several species of Gadus, but especially of G. morrhua, or common cod, a fish that abounds near the coasts of America in northern latitudes. Three varieties of the oil are found in commerce, the pale, the light brown, and the dark brown. The first named is procured from the fresh livers of the fish, sometimes by simple dripping, but more generally by maceration and a moderate degree of heat. In this country the livers are first reduced to a pultaceous mass by boiling with water, or by being inclosed in a metallic cylinder surrounded with steam. Afterwards, upon standing, the oil separates, floats upon the surface, and is

Times and Gaz., Mar. 1864, p. 254. BEHREND, Lancet, May, 1864, p. 607. Bull. de Thérap., liv. 39; Annuaire de Thérap., xxiii. 201.

years later, he added twenty other cases to the number, besides several of scrofulous disease.¹ The success of the remedy in the practice of many German physicians, was made known² in France in 1837 by Taufflieb,³ Riester,⁴ Carron du Villards,⁴ who also recommended it as a topical remedy for ulcers of the cornea,⁶ by Gouzée⁻ and others. In England, Dr. J. H. Bennett, who had become acquainted with the remedy in Germany, first drew attention to it by the publication of a treatise,⁶ which drew upon him a grave reproof for expending so much enthusiasm upon a subject which, in the opinion of the reviewer, did not call for any at all.⁰ Time, however, did justice to the correctness of his conclusions, for in 1853 we learn from Dr. Theophilus Thompson, one of the physicians to the London Hospital for Consumption and Diseases of the Chest, that six hundred gallons of the oil were annually used in that institution.¹⁰

ACTION OF THE OIL. On Nutrition.—Dr. Pollock has contributed some very interesting information in regard to the influence of codliver oil upon the fattening of animals, particularly pigs, bullocks, and sheep. In all there seemed to be a decided limit to the quantity which could be digested. Pigs consumed from one two ounces per diem; sheep, one ounce; and bullocks, from three to nine ounces. If more was taken, it invariably produced derangement of the digestion, and gave the fat a yellow appearance, and a fishy taste.11 Klencke shaved some young dogs, and rubbed them with cod-liver oil twice daily for three weeks. At the end of this period, they were in as good condition as dogs to whom oil had been internally administered; their bile was found as rich in fat, and their chyle equally charged with corpuscles without nuclei. Similar changes were observed in the bile and chyle of a cat bathed twice a day for some time in the same liquid, and some oil was discovered in the urine of the animal, proving, it was supposed, its free absorption by the skin."

The fattening influence of the oil on man is too familiar to need particular illustration in this place. It was first noticed by Bardsley. Simon, and also Thomson, have shown that under the use of the oil the proportion of red globules in the blood is materially increased. These changes in the blood are most conspicuous during the treatment of phthisis, and will be alluded to more particularly in the sequel. It would appear probable that the continued use of the oil may sometimes predispose to local parenchymatous congestions. Dr. Benson found a congested and consolidated condition of the lung unusually frequent in consumptive patients treated by its means, and although Dr. Bennett says he never knew it to induce pneumonia, or fatty disease

² Die Neue Arzneimittel., p. 508.

⁵ Bull. de l'Acad., i. 459.

4 Journal des Progrès, 1830, ii. 182.

¹ Richter, op. cit.

³ Gaz. Méd., v. 502.

⁶ Bull. de Thérap., 1834, vi. 266.

Bull. de Thérap., xiv. 279.
 Treatise on the Oleum Jecoris Aselli, or Cod-liver Oil, as a Therapeutic Agent in Certain Forms of Gout, Rheumatism, and Scrofula, London, 1841.

Brit. and For. Med. Rev., Jan. 1842, p. 197.

¹⁰ Clinical Lect. on Pul. Consumption (Am. ed.), p. 93.

¹¹ Lancet, Nov. 1853, p. 435. 12 Thompson, op. cit., p. 100.

<sup>Brit. and For. Med.-Chir. Rev., Jan. 1856, p. 249.
BRAITHWAITE'S Retros. (Am. ed.), 1850, xxi. 356.</sup>

contributing, as cod-liver oil does, to the production of fat, and thereby tending to restrict the waste of the nitrogenized tissues.

Bardsley, and, since his time, other observers, have noticed an itching of the skin, with prickling heat, and a papular eruption, from the internal use of the oil. The perspiration is generally increased, and a fishy odor exhales from the whole body. The urine is commonly augmented, and generally furnishes a lateritious deposit. In females, the catamenial flow is apt to be augmented, and when it has been suppressed by disease, is often re-established under the influence of the oil.

Modus Operandi.—From the preceding considerations, as well as from the effects of the medicine in disease, it may be inferred that cod-liver oil is essentially a fat-producing agent. To this quality it owes, in a great measure, its controlling power over scrofulous and tuberculous diseases, the most prominent effect of which is to cause a wasting of the adipose and then of the muscular tissue. It may be stated, in confirmation of this view, that all tradesmen who are habitually in contact with fatty substances, e. g., butchers, cooks, oil-men, tallow-chandlers, &c., are less liable than others to scrofula and phthisis. It is also well known that modes of treatment for phthisis have at various times been vaunted, which consisted chiefly in the use of oily substances, such as asses' milk, cream, butter, fat pork, buffalo marrow, If cod-liver oil has been more efficient than these, it is because it contains principles in which they are deficient, and which facilitate its digestion, either by promoting the secretion of bile, or by otherwise favoring its own assimilation, as well as that of the nutritious food which is given in connection with it.

REMEDIAL EMPLOYMENT. Chronic Rheumatism.—In Germany, where cod-liver oil was first used extensively for this disease, a large number of the most eminent physicians place it in the first rank as an anti-rheumatic medicine. This estimate of its value, says De Jongh, "is not founded upon mere assertion, but is established by innumerable cases of undoubted cure, in which patients had suffered many years from rheumatic disease, and after, in vain, trying every other means, had eventually been restored by cod-liver oil." But, on examining the subject, this estimate is hardly sustained. As long ago as the time of Bardsley, we find that this physician spoke of cod-liver oil as a medicine of "efficacious but limited powers," chiefly in chronic rheumatism with rigidity of the joints.' Even earlier, Darbey described particularly the cases to which it is adapted. He says: "Men and women, advanced in years, whose fibres may be supposed to have acquired a degree of rigidity, find surprising effects from the oil. Some who have been cripples for many years, and not able to move from their seats, have, after a few weeks' use of it, been able to go with the assistance of a stick; and, by a longer continuance, have enjoyed the pleasing satisfaction of being restored to the natural use of their limbs, which, for a long time before, had been a burden to them." Taufflieb, also, says that the operation of the remedy is most

¹ Med. Reports, p. 20.

² Percival's Essays, ii. 361.

upon the general subject under consideration, we shall find it profitable to inquire what are the effects of cod-liver oil in the several forms of scrofula. But there is one remark which is applicable to them all. In proportion as the local disease affects a person who has been subjected to bad hygienic influences, and especially to the use of coarse and innutritious food, does the action of the oil appear to be prompt and decided. Where, on the other hand, it has become developed in spite of favorable external conditions of living, and particularly when, as often happens, the digestion is very feeble and imperfect, the oil is seldom tolerated, and rarely produces any good effects.

In scrofulous enlargement of the parotid, thyroid, and submaxillary glands, and of those seated in the neck, axillæ, and groins, cod-liver oil is of little use. In such cases, when caries of the bones exists at the same time, it is not unusual to find the latter disease getting well under the use of the remedy, while the glandular affection remains unaffected. This result is strongly in contrast with what takes place under the administration of iodine, which causes the glandular enlargement to decline, but does not influence the caries. But when scrofulous abscess and ulceration have attacked the glands, and an indolent ulcer with excavated edges remains, or one extending under the skin and between the muscles, nothing promotes a cure so certainly as cod-liver oil. In such cases the patient is frequently anemic, emaciated, nervous, and dyspeptic, but under the use of the remedy speedily recovers that tone of the system which is necessary to his This curative power is signally manifested in healing cold abscesses after their evacuation; the serous is replaced by a purulent discharge, healthy granulations cover the indolent surface of the sore, and cicatrization ensues.

Cod-liver oil has been vaunted as almost a specific for tabes mesenterica. Brefeld and various other physicians have found it singularly successful in cases supposed to be of this nature. But when we consider that enlargement of the mesenteric glands must be very great before it can be detected through the tumid abdomen which belongs to this affection, also that such enlargement is usually tuberculous, and, further, that a tumid abdomen is common among scrofulous, and especially rachitic, children, and often results from dropsy caused by enlargement of the liver, we cannot avoid entertaining some doubt respecting the reality of the alleged cures. Unquestionably the medicine has frequently converted the child of pale and emaciated features, shrunken limbs, and projecting abdomen, into one of comely look and fair proportions; but never, it is believed, when the detection of mesenteric tumors through the parietes of the abdomen has rendered their existence certain.

In scrofulous ophthalmia, particularly in granular inflammation of the conjunctiva, blepharitis, and ulceration of the cornea, cod-liver

The very singular statement is attributed to Segnitz, that when the oil is given to children predisposed to scrofula, the disease may be developed by its use; that in young children it may bring on atrophy, and that in such cases the teeth usually decay. (De Jongh, p. 104.)

joints, than in affections of the joints themselves. Among the latter, arthritis of the ankle-joint was most distinctly benefited, and the like affection of the hip-joint, the least so. Lebert prescribed not more than two or three tablespoonfuls a day of the oil, but required it to be continued for many months, indeed for a year or even more.

Rachitis.—Physicians who have made use of cod-liver oil in this affection, are unanimous in according to it extraordinary curative powers. Since the first publication upon the subject by Schenk in 1826, proofs of its efficacy have accumulated on every side. France a knowledge of its virtues were obtained accidentally by Bretonneau, from a Dutch merchant, whose child was affected with rachitis. Soon afterwards, the remedy was tried by Trousseau with unlooked for success, and by him its virtues were more widely published.1 The cases in which he used it included children with imperfect ossification of the bones, enlargement of the cranium with persistence of the fontanelles, tardy or premature dentition, enlargement of the liver, and abdominal dropsy. Sometimes after four or five days of treatment, the pains in the limbs ceased, and at the end of a fortnight, bones which before were flexible, acquired a good degree of firmness. times, indeed, the treatment failed, either because the digestive organs did not become habituated to the oil, or because it could not be assimilated, or because it was impossible to make the little patients take it regularly. In softening of the bones occurring in adults, the oil sometimes produces a surprising cure.

Diseases of the Skin.—The benefits of cod-liver oil in cutaneous diseases, appear to be confined chiefly to those which are engrafted upon a scrofulous or a cachectic state of the system. When an original

inflammatory element prevails, the oil is worse than useless.

Lupus, which is eminently a disease of scrofulous origin, is, more perhaps than any other, curable by this medicine. Emery treated seventy-four persons affected with lupus, twenty-eight of whom are said to have been cured, while, of the remainder, those who continued under treatment were greatly benefited. When the medicine was fully tolerated, he prescribed it in doses which were gradually increased until they amounted to a pint or more of the oil in a day.3 Dr. Terlinck, of Ghent, has described the case of a man in whom this disease occupied the sternum, neck, and left cheek. He commenced by taking half a pound a day of the oil, and gradually increased the dose until it reached three pounds a day. The treatment, which ended in a perfect cure, lasted six months, during which time two hundred and sixty five pounds of cod-liver oil were taken. The necessity of such enormous doses is far from being apparent, for an equally aggravated case with that just mentioned was cured by Mareska, with doses of two or three tablespoonfuls a day. whose large experience entitles his opinion on the subject to respect, pronounces this medicine the most efficacious of all that are employed in the treatment of lupus, and believes that of itself, even, it is often

Jour. de Médecine, 1844, ii. 321.

Bull. de Thérap., xxxv. 373.

Abeille Med., ix. 209.

BEYLARD, Bull. de Thérap., xliv. 41.

⁴ Edinb. Month. Jour., Aug. 1852, p. 231.

tence to testify in a case like the present, no one will deny. The power of the medicine in staying the demon of destruction is, he remarks, sometimes marvellous. "We repeatedly find forms and degrees of disease that former experience has taught us to be utterly hopeless and speedily fatal, retarded, arrested, nay, sometimes even removed and almost obliterated by various processes of restored health." At the same time Dr. W. refrained from pronouncing in regard to the permanence of the cure which was thus so happily The same year, in the First Report of the London Hospital for Consumption,' it is stated that in about eighteen per cent. of the cases treated the disease was arrested, in about sixty-three per cent. it was improved, and in nineteen per cent. it went on unchecked. It was now also observed that occasionally the weight increased without an amelioration of the symptoms, and also that sometimes relapse occurred followed by a rapid progress to a fatal issue. The larger experience of a series of years diminished somewhat the enthusiasm and confidence which the new remedy had originally inspired, and we find that in 1853, Dr. Bennett, himself, thus briefly states its value: "Its effects in phthisis are, to nourish the body, which increases in bulk and in vigor; to check fresh exudations of tubercular matter; and to diminish the cough, expectoration, and perspiration."2

The great and enlightened experience of Dr. Walshe led him to conclusions which we now proceed to quote. The reader will observe, that while he concedes to the oil all of the nutrient qualities which have been claimed for it, he is not prepared to regard it in any sense

a cure for tubercular consumption.

"1. That cod-liver oil more rapidly and effectually induces improvement in the general and local symptoms than any other known agent. 2. That its power of curing the disease is undetermined. 8. That the mean amount of permanency of the good effects of the oil is undetermined. 4. That it relatively produces more marked effects in the third than in the previous stages. 5. That it increases weight in favorable cases with singular speed, and out of all proportion with the actual quantity taken; that hence it must in some unknown way save waste, and render food more readily assimilable. 6. That it sometimes fails to increase weight. 7. That in the great majority of cases, where it fails to increase weight, it does little good in other ways. 8. That it does not relieve dyspnœa out of proportion with other symptoms. 9. That the effects traceable to the oil in the most favorable cases are: increase of weight, suspension of colliquative sweats, improved appetite, diminished cough and expectoration, cessation of sickness with cough, and gradual disappearance of active physical signs. in some cases it cannot be taken, either because it disagrees with the stomach, impairing the appetite (without itself absolutely nourishing), and causing nausea, or because it produces diarrhoea. 11. That in the former case it may be made palatable by association with a mineral acid; and in the latter prevented from affecting the bowels by com-

¹ Lond. Month. Jour., Nov. 1849, p. 239.

² The Pathology and Treatment of Pulmonary Tuberculosis, p. 64.

In the foregoing remarks phthisis has been spoken of as if it were a disease which uniformly follows the same course. But it must not be forgotten that there are cases of acute tuberculization of the lungs, which terminate fatally in a few weeks, and that there are chronic cases in which the tuberculous deposit is limited, or occurs at long intervals in successive crops. In acute phthisis, cod-liver oil, like every other remedy, is totally unavailing. On the other hand, in that form which occurs in persons of a lymphatic temperament, and whose functions, especially those of nutrition and circulation, are feeble and sluggish, the greatest advantage may be hoped from a systematic use of the oil. But much will depend upon the extent of the disease. A cavity of moderate size, confined to the upper lobe of one lung, is infinitely more curable than scanty but disseminated tuberculous deposits in both lungs. Probably the best among the demonstrable results of cod-liver oil are an arrest of the signs of progressive tuberculization, and the gradual contraction of pulmonary cavities.1

In other diseases, involving more or less deterioration of the nutritive function, cod-liver oil is often of signal service. Chronic bronchitis is one of these, whether it succeeds the acute affection and occupies both lungs, or whether it results from chronic pleuro-pneumonia, and is confined to a single lung. Chronic pleurisy itself, when debility hinders the absorption of the pleuritic effusion, may be sometimes benefited by this remedy conjoined with iron and a general tonic regimen. Laryngismus stridulus, depending upon a weak and irritable condition of the system, and diabetes, are also said to have been cured

by it.3

Dr. Anstie has called attention to the usefulness of cod-liver oil in the treatment of chronic convulsive diseases, viz. paralysis agitans, simple epilepsy, mercurial tumor, and chorea. The cases of these affections benefited by the treatment were those of persons of a very feeble constitution, or who had been reduced to a state of great debility by the predisposing causes of the disease that affected them. In other words, the oil cured them by virtue of its nutritive operation. This oil has been recommended as a specific remedy for night blindness by Des.

year 1847, whereas the use of the cod-liver oil began five years before. It will also be observed that this ratio experienced the most marked declension in the year 1849, 1850, and 1851, after which it again rose, although the use of the oil probably became more general at the same time. The improvement in the ratio of mortality in the second decade, as compared with the first, is probably due to the rapid increase of the population by immigration from the country, and from beyond the seas. This increase is illustrated by the aggregate mortality from all causes, which in 1836 was 5448, and in 1856, had reached 12,334, and in 1858, was 10,697. During this period, a very large number of adolescents and adults was added to the population, and tended to diminish the proportion of those who, from innate or acquired debility, are the chosen victims of consumption. We suspect that the gold of California, which everywhere has fostered the growth of cities at the expense of the rural districts, is the real cause of the slightly diminished ratio of mortality of consumption during a portion of the last ten years.

For illustrations of arrested phthisis the reader is referred to the cases published by Quain, Lancet (Am. ed.), 1851, pp. 31, 109, &c.; Greenhow, ibid. (Engl. ed.), December, 1854, pp. 502, 542.

Bd. Month. Jour., April, 1850. Times and Gaz., March, 1863, p. 330.

³ Lancet, Sept. 13, 1851.

A small dose should always be given at first, and gradually increased to a tablespoonful or two, three times a day. More than this is gene-

rally superfluous, and sometimes injurious.

In regard to the methods of administering the oil by chyster, and by inunction, it is enough merely to name them. The former cannot long be tolerated or be useful, and the latter, except in certain cutaneous affections, is objectionable for its uncleanliness.

POTASSÆ CHLORAS.—CHLORATE OF POTASSA.

DESCRIPTION.—Chlorate of potassa may be prepared by passing chlorine gas through a warm and concentrated solution of carbonate of potassa. By this means chloride of potassium and chlorate of potassa are generated, and as the liquor cools the former remains in solution, while the latter is deposited in the form of oblique rhomboidal crystals of a pearly lustre. This salt is inodorous, of a cool saline taste, is perfectly neutral and anhydrous, and is but little changed by exposure to the air. On decomposition by heat it yields 39 per cent. of its weight of oxygen. Water at 60° F. dissolves only fifteen parts of it, but according to Hutchinson, 25 grains are soluble in an ounce of hot water. Chlorate of potassa does not precipitate albumen, and is said to be soluble in all of the animal fluids without

decomposing them or undergoing any change itself.

HISTORY.—In 1786 this salt was discovered simultaneously by Berthollet and by Higgins. The former, who alone recognized its real composition and qualities, named it hyperoxymuriate of potassa (muriate suroxygéné de potasse). It was first employed in medicine at the suggestion of the chemists, who presumed that the oxygen which it contains so abundantly would tend to counteract the putrefaction, which, according to their theories, characterized certain diseases, and especially syphilis. Among the medical writers, at the beginning of the present century, who adopted these opinions were Rollo, Garnett, Cruikshank, Chisholm, Alyon, and Odier. Rollo boasted of the success of the medicine in scurvy, nervous fever, diabetes, and dysentery, as well as in syphilis,1 and so persuaded was he of its singular virtues as to declare that it "merits a trial in hydrophobia." Ferriar states that he found it efficacious in true scurvy, and he thought that the soreness of the gums was sooner healed by it than by ordinary remedies.3 But the medicine did not, apparently, fulfil the promises made in its behalf, and except that about 1815 it was proposed by several German physicians as a remedy for neuralgia, as it had originally been by Chisholm, and that Ferriar's suggestion of its use in scorbutic sore mouth was acted upon by some Swedish practitioners, it appears to have been almost entirely neglected or forgotten. In 1831, it is true, Dr. O'Shaughnessy proposed the injection of a solution of the salt into the veins of cholera patients in order

Med. Hist. and Reflect. (Am. ed.), p. 388.

¹ Sprengel, Hist. de la Méd., vi. 423. On Diabetes Mellitus, ii. Pref. xiii.

passes off unchanged by the urine. Wöhler and Stehberger afterwards confirmed this statement, and subsequently also Gustin, but the experiments of Isambert were more definite in their results. They show that within five minutes after the medicine is taken it may be detected in the saliva, and within fifteen minutes in the urine, and also that the elimination of the salt continues for a period of from fifteen to forty-eight hours. The maximum rate of its discharge is attained in an hour or two. It was detected in the milk of nursing women, the tears, the nasal mucus, and the perspiration. It was also found, in a small proportion, in the bile of children who died while

using it medicinally.

Some years ago Dr. Osborn suggested that chlorate of potassa might not always be a harmless medicine, but he offered no ground for his suggestion beyond the statement that in his own person doses of five or ten grains occasioned some fulness of the head and dryness of the throat.³ The suggestion was echoed by Mr. Weeden Cooke, but he, too, had no reason to give for it beyond this: that as the medicine was powerful for good, it might be for evil also.4 There are only two examples of injury produced by chlorate of potassa. The one occurred in a case of phthisis for which a physician prescribed three hundred grains of the salt to be taken daily in solution. The unfortunate victim of professional ignorance took this dose on four consecutive days, when "the pains in his bowels became very severe, incessant vomiting came on, and finally death ensued." The stomach, after death, is reported to have been "inflamed on its external surface, while its mucous coat was entirely disorganized and softened." other was the case of Dr. Fountain, who took, at a single dose, an ounce of chlorate of potassa to testify his belief in the perfect innocuousness of large doses of the medicine. A most violent gastrointestinal inflammation occurred, with copious diuresis, followed by suppression of urine. In this case death took place on the seventh day. The fatal consequences of a dose of one ounce of the salt were certainly not to have been anticipated or even seriously dreaded, for in experiments performed many years ago by the late Dr. Tully half an ounce and then an ounce were several times taken without any alarming consequences whatever.7

Uses. Mercurial Salivation.—In a note to Jourdan's Pharmacopœia, published in 1840, vol. ii. p. 289, it is said, "Eyr [? Sir James Ayre] used twenty-five grains of chlorate of potassa in four ounces of water, of which three tablespoonfuls a day were given, for ulcers of the mouth following excessive salivation." This is the first indication which we find of the salt having been used as a remedy for the effects of mercury. In 1846, Mr. John Allison, from the analogy which he presumed to exist between anæmia and the mercurial cachexia, and his belief in the power of chlorate of potassa to cure the former disease, was induced to prescribe it for mercurial salivation;

¹ In 1831, vid. supra.

³ Lancet, Oct. 1859, p. 363.

⁶ Am. Med. Times, ii. 53.

⁷ Ibid., iii. 3.

^{*} Strumpf, Handbuch, ii. 632.

⁴ Ibid., p. 449.

[•] Ibid., ii. 245.

HERPIN, Chlorate de Potasse, p. 31.

this affection, and Dr. J. F. Meigs has seldom found it necessary to employ any other means.2 With Dr. Risdon Bennett, its use was attended with the best results; Mr. Headland and Golding Bird prescribed it with much benefit; Mr. Babington was equally successful in its employment during an epidemic of the disease at the Coleraine Union Workhouse in 1849; and Dr. Hicks in one (which he incorrectly describes as of aphthæ).6 To these may be added the equally favorable results of Blache, Mazade, Bergeron, Hutchinson, and Isambert. As in the case of mercurial sore mouth, the first effect of the salt is to impart a livelier color and greater vigor to the affected parts; the serrated edges of the false membrane are rounded off, the swelling subsides, and the false membrane itself is cast off between the third day and the fifth, and perhaps is succeeded by another, but a smaller one, while the ulcer fills up and tends to heal. Generally the cicatrization is perfect; but sometimes a linear ulcer remains, which it requires the action of lunar caustic wholly to cicatrize. (Isambert.) It appears that in this affection the size of the dose is not always a measure of its efficacy, two or three, or twenty or thirty grains, in different cases appear to have been equally efficient.

There is also some doubt whether the remedy is not in a great degree local in its operation. The experiments and observations of M. Laborde appear to render it certain, at least, that the topical application of the medicine is quite sufficient for a cure of the disease more particularly in question, and those of Bouchut, Cerboni, and Mr. Hutchinson, for the cure of ulcers in various parts of the body, confirm this conclusion. Additional illustrations will be found below.

In this connection may be noticed the beneficial effects of the medicine in scurvy. As already stated, it was once highly recommended by Rollo as a remedy for this disease, but quite recently we have the evidence of an English naval surgeon in support of its efficacy, and Dr. Fountain, of Davenport, Iowa, reported its unequivocal advantages in a mild epidemic of land scurvy, in which the symptoms were for the most part local.

Follicular Stomatitis.—Aphthæ. This is a much slighter affection than the one just discussed, and, in general, tends spontaneously to cure, but its removal is expedited by the administration of the chlorate. This would appear to result from the observations of Mr. Hutchinson. Dr. Hauner, of Munich, reports it as having been successful in seventy cases of the disease in doses of from half a drachm to a drachm given in the twenty-four hours.¹⁴

Gangrenous Stomatitis.—A case stated to have been of this disease occurred under the care of M. Blache in the course of typhoid fever

```
Diseases of Infancy and Childhood, 3d ed., p. 432.

Diseases of Children, 2d ed., p. 236.

Lancet, Oct. 1844, p. 114.

Lancet, Oct. 1844, p. 114.

Dublin Quart. Jour., Feb. 1850, p. 236.

Dublin Quart. Jour., Feb. 1850, p. 236.

Bull. de Thérap., liv. 289.

Bull. de Thérap., liv. 289.

Diseases of Infancy and Childhood, 3d ed., p. 432.

Lancet, Oct. 1844, p. 114.

Bull. de Thérap., l. 337.

Bull. de Thérap., l. 337.

Diseases of Children, 2d ed., p. 236.

Bull., March, 1846, p. 278.

Bull. de Thérap., l. 337.

Lancet, Dec. 1857, p. 648.

Lancet, Dec. 1857, p. 648.

Lancet, Dec. 1857, p. 648.
```

¹⁴ Rdinb. Jour., Oct. 1856, p. 370.

tion of Chaussier was made, various saline or alkaline preparations were in use with a view of producing the solution of the croupal false membrane, such as the carbonate of ammonia, and the sulphuret of The latter, indeed, was vaunted as infallible. into disuse; but the chlorate of potassa, which does not appear to have been employed by any one but Chaussier, is now revived with perhaps a better prospect of continuance. In the wards of M. Blache, at the Children's Hospital of Paris, four cases of membranous croup appear to have recovered under the sole influence of this preparation; and in several others in which tracheotomy also was employed, the results were more favorable than can fairly be attributed to the operation alone. In some cases, also, of secondary croup, the remedy is represented by M. Garasse to have been completely successful. Nearly all of the cases above referred to seem to have been those in which the diphtheritic inflammation extended to the larynx from the fauces, and to have assumed the moderately asthenic type so usual in hospital practice; it may, therefore, perhaps be questioned whether in primitive laryngeal or tracheal croup, the medicine would prove as serviceable. If, however, more extended experience should confirm the results already obtained, the introduction of chlorate of potassa into the treatment of croup would be of incalculable value.

In this connection the suggestion made by M. Barthez may be referred to. This physician found that false membrane introduced into a solution of chlorate of potassa or chlorate of soda, but especially into the latter, undergoes softening much more speedily than it does in water alone. He accordingly has proposed to use these solutions locally as well as internally in diphtheritic affections, and in croup, to instil them into the air-passages after the operation of tracheotomy.

Facial Neuralgia.—Chlorate of potassa appears to have been first employed in this affection by Chisholm, who by means of it cured a very aggravated case of tic douloureux, which all other remedies had failed to relieve. The dose employed was thirty grains a day. The effect is said to have been wonderful indeed; no other treatment whatever was used, and at the expiration of three weeks' continued exibition of the remedy, the patient was entirely freed from the complaint. Sachs and Dulk' state that, after personal experience with the medicine, they regard it as the surest of all remedies that have been proposed for facial neuralgia; yet they, after all, admit that it is rather a palliative than a cure. Other German physicians used the medicine with good effect, as Knod, Herber, and J. Frank, the last of whom states that by its means he cured a case in which section of the nerve could not be employed. Dr. Copland thinks it not without efficacy in the rheumatic and hysterical states of the disease.

Dr. Watson states that, at the suggestion of Dr. Hunt, he is in

¹ Abeille Med., May, 1857, p. 121.

² Amer. Jour. of Med. Sci., Oct. 1858, p. 514.

An Essay on the Malignant Pestilential Fever, 2d ed., ii. 450.

⁴ Handwörterbuch der prakt. Arzneim., 2ten Theil. 2te Abtheil, s. 536.

⁵ Pathologie Med., trad. française, iii. 297.

Dict. of Med. (Am. ed.), ii. 1023.

investigation of this medicine, believed on theoretical grounds, that it is a peculiarly appropriate remedy in the early stages of phthisis; and a physician of Belfast, after satisfying himself that it ought to cure the disease, persuaded himself that it is actually endowed with this virtue above all price. But Dr. Austin Flint, in this country, and Dr. Cotton, in England, after a sufficient trial of its powers, concluded that it has no specific action in phthisis, and, in the confirmed disease, at least, does not arrest or retard its progress. Chisholm speaks of its having cured a hydrocele of a year's standing. Mr. Hutchinson is of opinion that ulcers, abscesses, eruptions, &c., connected with a cachectic state of the constitution, are generally benefited by its use.

Locally, a solution of chlorate of potassa has been found very useful in correcting the fetor, and improving the condition of ulcerated surfaces in cancer, phagedæna, and ozæna, deodorizing fetid mucous discharges, offensive breath, &c. A solution made by dissolving a drachm and a half, or from that to three drachms, of the salt in a pint of water, is recommended by Mr. C. H. More. Dr. Henry has reported two cases of ozæna which had proved intractable to various other means, but were cured by snuffing a solution of one drachm of the salt in four ounces of water, and Dr. Ormerod employed it successfully in a case of the same disease.

Dr. B. Brown, of North Carolina, used injections of a solution of chlorate of potassa (3j to Oss) in cases of leucorrhæa attended with ulceration of the os uteri and cervical canal, and enlargement of the muciparous glands of the vagina, and also for simple ulceration of these

parts without leucorrhœa."

M. Mazade found that lotions or gargles containing this preparation are very useful in removing aphthous or pseudomembranous ulceration of the mouth and fauces, occurring during certain epidemics. Indeed, as already remarked, it may be questioned whether in the internal administration of the medicine a portion of its good effect is not due to its local action during deglutition. Gibert has shown this to be probably the case by the results which he obtained in similar affections to the above, by using the salt in substance finely powdered, or gargles which contained it. In like manner Laségue cured mercurial sore-mouth by strong solutions of chlorate of potassa, locally applied.

ADMINISTRATION.—Chlorate of potassa is generally administered in solution. The dose for children under three years of age is about five grains three or four times a day, and for an adult from ten to thirty grains. It should first be dissolved in hot water, and then a sufficient quantity of gum and sugar added to suspend the undissolved portion.

The best time for its administration is before meals.

As a lotion, from sixty to one hundred and twenty grains may be

Am. Jour. of Med. Sci., Jan. 1861, p. 235.

Dublin Quart. Jour., Nov. 1861, p. 338.
 Am. Jour. of Med. Sci., Oct. 1861, p. 321.

Lancet, May, 1855, p. 514.
 Lancet, Oct. 1858, p. 386.

⁸ Am. Jour. of Med. Sci., July, 1857, p. 66.

¹⁰ Ibid., p. 524.

⁴ Times and Gaz., May, 1862, p. 531.

⁵ Bull. de Thérap., lii. 430.

⁹ Bull. de Thérap., l. 344.

¹¹ ISAMBERT, op. cit., p. 34.

vomited frothy mucus, and died exhausted in from twelve to thirty-six hours. On dissection, the mucous membrane of the stomach was ulcerated and gangrenous, and that of the small intestines softened. When Orfila introduced the same quantity of the salt dissolved in two ounces of water into the stomach of a dog, symptoms were produced resembling those just described, in this, that debility appeared immediately to follow the operation, but was succeeded by a state of great excitement with evidences of suffering, convulsions and tetanic rigidity of a high grade. The same quantity of the dry salt was administered to another dog, and the symptoms were identical with those in the first experiment. In neither case were the lesions which Smith describes found in the stomach.

Mitscherlich, who repeated these experiments upon rabbits, observed the same symptoms of depression followed by spasm, and after death a large increase of the mucous secretion of the stomach and intestines, some softening of the epithelium, and slight vascular injection. The blood was unusually liquid, and formed a small clot. These results agree perfectly with Orfila's, and show that the lesions described by Smith were not due to muriate of ammonia. Arnold, who also used rabbits in his experiments, reports that he found some softening and injection of the gastric mucous membrane, but nothing more.

Gieseler found that dogs were seized with vomiting in an atmosphere highly charged with the fumes of muriate of ammonia, and frogs rapidly destroyed, the skin of their bodies exuding mucus copiously, while the limbs became very dry. Copious evacuations took place from both mouth and anus before death, and afterwards putrefaction

set in rapidly.

On Man.—At the close of the last century, Gmelin's said of this salt, that it is by far the most powerful of saline preparations whether as an internal or an external agent, "for dissolving viscid and stagnant humors and preventing putrefaction." He further stated that it irritates the stomach and bowels, dissolves their sordes accumulated by torpor, promotes secretion from mucous membranes and the uterus, and overcomes "obstructions of the mesentery." These views, although couched in the medical dialect of the day, correspond closely with the results of recent experiment. According to Sundelin, it exerts a sedative influence on the system. Indeed, its action on the secretions appears to be partly due to this cause, and to a direct operation upon the blood, whereby it diminishes the plasticity of the latter, and thus promotes glandular secretion and the absorption of fibrinous exuda-By this view of the action of the salt, Sundelin vindicates his classing it among the alterative remedies, and his comparing it with mercury. The more recent, pains-taking, and exact investigations of Böcker, tend to support this theory. He has shown that during the use of the salt, the proportion of urea excreted is augmented; that the stools become somewhat softer, and are largely mixed with mucus; that it increases the secretion of all the mucous membranes, and

Lehrbuch der Arzneim., ii. 300.

^{*} Apparat. Med., Pars II., i. 84.

⁸ Archives Gén., xix. 402.

⁴ Heilmittellehre, i. 150.

had only one fit, and of the remaining two cases, one had a third and the other a fourth paroxysm. These results are certainly indicative of the medicine possessing some, and not a little, power over intermittent fever. But it must be taken into account that the patients were, while under treatment, far removed from the locality in which the disease had been contracted. In 1851-2, M. Jacquot made use of the medicine in treating soldiers of the French army occupying Rome. He gave from two to five drachms of it as the daily dose, and observed that it often occasioned slight colic, looseness of the bowels, sour eructations, and even vomiting, effects which perhaps were not without their influence on the results of the treatment. These results consisted in the abrupt cessation of the paroxysms in six out of twentyone cases; but in two of the six cases the attacks returned. The locality in this case was a malarious one, the same, indeed, in which

the disease had been engendered.

In bronchial catarrh, after the first or inflammatory stage has subsided, muriate of ammonia promotes expectoration, and hastens the cure. It is said to be peculiarly adapted to cases which have their origin in a rheumatic or gouty metastasis. It was found by Dr. Rae of great service in hooping-cough. Under its use the expectoration loses its irritating, glairy character, and becomes less tenacious.* In chronic inflammations, or fluxes of the lungs, bowels, &c., with a tenacious mucous or muco-purulent discharge, it is often the means of affording marked relief. Oesterlen recommends it strongly as a remedy for gleet, in doses of half a drachm or more every two or three hours. So in leucorrhæa, depending upon an atonic condition of the uterine organs, particularly when associated with a state of general excitability which forbids the use of direct tonics; and in suppression of the menses, occasioned by cold, in young women of a torpid, phlegmatic constitution, Sundelin found it a very effectual remedy. "In cases of congestion of the mucous membranes," says Sir George Lefevre, "in chronic sore throat, with elongated uvula, and a flabby state of the tonsils and parts about the fauces, it is very beneficial. In that state of the mucous membrane of the stomach, caused by the action of a variety of medicines, which gives rise to the anorexia accompanying convalescence, I have seen it employed with happy results. The tongue loses its pallor, and acquires a healthier appearance from its use, and it paves the way advantageously for the more decided tonics in the convalescence after gastric fever."3

Muriate of ammonia has been reputed of great efficacy in various forms of chronic glandular enlargement, from simple hypertrophy and congestion, on the one hand, to scirrhus on the other. It is probably of use only when the enlargement results from retained secretions, or from plastic deposits. It must rather be injurious when tubercle or cancer forms the tumor, for in the latter case, the system is in need not of relaxation but of support. In certain cases of chronic enlargement of the liver with jaundice, and originating from cold, it appears

¹ Arch. Gén., 1854, 5ème sér., iii. 699.

² Lancet, Dec. 1858, p. 601. ³ Lancet, April, 1843, p 147.

Administration.—The disagreeable taste of muriate of ammonia

is best concealed by a solution of the extract of liquorice.

Its dose may vary from five to thirty grains, or even more, given at intervals of two or more hours. The smaller doses are best adapted to cases of chronic disease in which the alterative action of the remedy is desired.

SARSÁPARILLA.

DESCRIPTION.—Sarsaparilla is the root of Smilax officinalis and of other species of Smilax. These are all trailing plants with prickly stems, and hence the etymology of the name—sarza, a brier, and

parilla, a little vine.

Several species of smilax are natives of Mexico and the northern part of South America. According to the port whence it is shipped different names are applied to it, as Vera Cruz, Honduras, Brazil, and Jamaica Sarsaparilla. The roots, with or without the rootstalk, are dried and folded in bundles, and are thus found in commerce. roots are three or four feet long, flexible, about the size of a quill, somewhat wrinkled longitudinally, and with few or no filaments. The epidermis is generally of a brownish-gray color; the inner bark is whitish, brownish or reddish; the woody part is very thin, and in its centre is a white medulla or pith which abounds in starch. broken it emits a slight but peculiar odor, which is more evident when it is boiled; and when chewed its taste, which is at the same time mucilaginous and somewhat acrid, excites a flow of saliva. This peculiarity is due to a principle called sarsaparillin, which resides chiefly in the cortical portion of the root, whence it can be extracted by boiling water, or still better by alcohol. Sarsaparillin is white, crystallizable, and inodorous, has a bitter, acrid, and nauseous taste in solution; is almost insoluble in cold water, is soluble in hot water, to which it imparts the property of frothing, and still more so in hot alcohol, ether, and the volatile oils. It is readily dissipated by heat, which accounts for the inertness of the preparations of sarsaparilla made by boiling.

HISTORY. — The Spaniards first brought sarsaparilla to Europe about the middle of the sixteenth century, from Peru, St. Domingo, and Brazil. It was mentioned by Nicolas Massa as early as 1532, and by Prosper Alpinus, the Venetian, in 1591. Astruc says, "it is thought" to be a specific for secondary venereal complaints, especially those of a rheumatic form; and Fallopius asserts that although milder than guaiacum, it cures ulcers and fissures of the anus "twice as rapidly." It had, however, fallen into neglect, when, about the middle of the last century, the success of a secret medicine for syphilis which Dr. W. Hunter suspected to contain sarsaparilla, induced him to make use of the drug. He found it to answer his expectations, and having communicated the result to Dr. Fordyce, the latter became

¹ Medicina Ægypt., ed. nova, p. 253.

² Luisini, Aphrodisiacus, p. 805.

A simple infusion is to be preferred, if the virtues of sarsaparilla alone are to be employed, but the most efficient preparation in the treatment of constitutional syphilis, is the compound decoction.

A favorite form for employing sarsaparilla in Germany, is the decoction of Zittman. (Vid. U. S. Dispensatory.) This is of two kinds, the stronger and the weaker. Of the former, the patient is required to drink eighteen ounces every morning before rising, and of the latter, thirty-six ounces every afternoon, and of the strong decoction, again, eighteen ounces every evening, during four or five days! This

preparation contains a sensible quantity of mercury.

ACTION.—The operation of the active principle of the root and that of other preparations of the root itself, when given in equivalent doses, are identical. According to Palotta, six grains of sarsaparillin occasioned malaise and slowness of the pulse; eight grains, nausea and constriction of the throat; ten grains further produced a sense of general debility, and, at the end of half an hour, perspiration; thirteen grains gave rise to moderate vomiting of a bitter liquid, with irritation and constriction of the throat, faintness and general exhaustion.1 In like manner, Hancock found that a decoction of four ounces of sarsaparilla occasioned nausea, vomiting, depression of strength, and disinclination to exertion. The pulse, also, was somewhat lowered. Hjort observed, as the effects of a saturated decoction of the root, nausea, anorexia, constriction, of the throat, heaviness of the limbs, weariness, and headache. These effects of sarsaparillin and of large quantities of the decoction of sarsaparilla agree in all essential particulars, and do not differ from those which Pereira observed to follow large doses of the powdered root. The effects, however, of medicinal doses of the drug, as might be expected, are not so immediate or decided. They are manifested during a state of disease, rather than in health, and consist of an improved condition of the digestive and nutritive functions, and the gradual subsidence of the morbid derange-The diaphoretic and diuretic actions ascribed to sarsaparilla appear to be chiefly due to the quantity of fluid in which it is usually taken, and the circumstance of the skin being warm or cool at the time. Böcker concludes from his experiments with this substance, that it is neither diuretic nor diaphoretic, and that there is no evidence of its augmenting any secretion whatever.3 The absence of decided phenomena during its ordinary administration, and the evidence above adduced to show that its action is not merely negative, entitle the medicine to rank as an alterative. Whether it acts by "purifying the blood," according to the old phraseology, now become the popular one, or in what other manner, has not yet been determined.

Uses. In Syphilis.—When Fordyce reviewed the use of sarsaparilla in the middle of the last century, he stated that it had fallen into disrepute, and by degrees was almost forgotten, insomuch that some of the greatest masters in medicine asserted that its decoction is no better than barley water. He claimed that it restores the appetite

¹ GIACOMINI, op. cit., p. 306.

^{*} STRUMPF, Handbuch, ii. 330.

Jour. f. Pharmakodynamik, ii. 30.

Böcker, in his Essay upon this subject, shows by an analysis of the history of syphilis since sarsaparilla was first introduced, that there is no evidence whatever of its having displayed any curative properties in the disease, independently of the water with which it is taken in decoction, and the other more active medicines with which it is uniformly associated.¹

These citations suffice to show what are the opinions of those who have had most experience, respecting the virtues of sarsaparilla in constitutional syphilis. It is not competent to the cure of this affection, but it tends so far to promote the healthy action of all the functions as to enable it to co-operate usefully with mercury in the secondary, and with iodine in the tertiary forms of the disease, particularly when the cachectic state of the system renders the continued use of the former of these remedies injudicious, and of the latter insufficient.

In other chronic affections of a scrofulous, rachitic, rheumatic, or gouty character, which are characterized by a general derangement and impairment of the health, in connection with the local phenomena of some one or more of these diseases, it is very probable that a protracted course of decoction of sarsaparilla may be beneficial, but as much, perhaps, by the quantity of liquid that is taken, as by any medicinal principle that the preparation contains. It is also to be remembered that the simple decoction of sarsaparilla is very seldom employed alone. The preference is always given to one of those compounds which contain mezereon, guaiacum, or senna; and most frequently the iodide of potassium, or some other active medicine, is administered besides. If a cure ensues under such circumstances, the share which sarsaparilla takes in it must be problematical indeed.

CHLORINIUM ET CHLORINIA, vid. Irritants.
COLCHICUM, "Diuretics.
DULCAMARA, "Sedatives.
GUAIACUM, "Diaphoretics.
MEZEREON, "Irritants.

Jour. f. Pharmakodyn., ii. p. 37 et seq.

INDEX OF MATERIA MEDICA.

ABLUTION, cold, ii. 202
Absinth, ii. 618
Absinthin, ii. 618
Absinthium, ii. 618
Absorption, i. 42
avenues for, i. 46
conditions for, i. 48
Acacia, i. 98
Acetum, i. 235
. colchici, ii. 562
opii, i. 652
scillæ, ii. 532
Acid, acetic, i. 235
arsenious, ii. 695
benzoic, ii. 483
citric, ii. 218
gallic, i. 203
hydrocyanic, diluted, ii. 205
muriatic, i. 260
nitrio, i. 241
nitric, diluted, i. 241
nitro-muriatic, i. 262
succinic, ii. 32
sulphuric, i. 263
sulphuric, aromatio, i. 263
sulphurie, diluted, i. 263
sulphurous, i. 263
tannic, i. 196
valerianic, ii. 33
Acidum aceticum, i. 235
dilutum, i. 241
arseniosum, ii. 695
benzoicum, ii. 483
oitricum, ii. 218
gallicum, i. 203
hydrocyanicum dilutum, ii. 205
muriaticum, i. 260
nitricum, i. 241
nitricum dilutum, i. 241
nitro-muriaticum, i. 262
nitro-muriaticum dilutum, i. 263
sulphuricum, i. 263
sulphuricum aromaticum, i. 263
sulphuricum dilutum, i. 263
sulphurosum, i. 263
tannicum, i. 196
valerianicum, ii. 33
Aconite leaf, ii. 252
root, ii. 252
Acceptia, ii. 252
lacedet deligna, il. 252
42

```
Affusion, cold, ii. 201
Air, warm and dry, i. 536
Alcohol, i. 589
    diluted, i. 590
    dilutum, i. 590
    fortius, i. 590
    stronger, i. 590
Alkaline irritants, i. 270
Allium, ii. 474
Almond, bitter, i. 117
    sweet, i. 117
Aloe, ii. 440
Aloes, ii. 440
Aloin, ii. 440
Alteratives, ii. 629
Althæa, i. 100
Alum, i. 151
    benzoated solution of, i. 162
    curd, i. 162
    whey, i. 162
Alumen, i. 151
Alumina, sulphate of, i. 162
Alumina and zinc, sulphate of, i. 162
Amber, ii. 31
Ammonia, carbonate of, i. 630
    muriate of, ii. 783
    phosphate of, ii. 527
    solution of acetate of, ii. 495
    stronger water of, i. 270
    tartrate of iron and. i. 382
    valerianate of, ii. 33
    water of, i. 270
Ammoniacum, ii. 476
Ammoniac, ii. 476
Ammoniæ carbonas, i. 630
    murias, ii. 783
    phosphas, ii. 527
    valerianas, 11. 33
Amygdala amara, i. 117
    dulcis, i. 117
Amylaceous lenitives, i. 110
Amylum, i. 110
Anarcotina, i. 679.
Angelica, i. 491
    garden, i. 491
Angustura, i. 483
Anise, i. 495
Anisum, i. 495
Anthelmintics, ii. 604
Anthemis, i. 477
Antimonii et potassæ tartras, ii. 339
     terchloridum, i. 330
Antimony, butter of, i. 330
    and potassa, tartrate of, ii. 339
     terchloride of, i. 330
```

Antispasmodics, ii. 17	Buchu, ii. 541
Apiol, ii. 537	Burgundy pitch, i. 339
Aqua ammoniæ, i. 270	Butternut, ii. 427
ammoniæ fortior, i. 270 calcis, i. 298	CALAMUS, i. 488
camphoræ, ii. 52	Calcis carbonates, i. 298
ohlorinii, i. 246	Calomel, ii. 634
cinnamomi, i. 500	Calor, i. 534
fœniculi, i. 506	Calumba, i. 468
menthæ piperitæ, i. 512	Calx, i. 298
menthæ viridis, i. 513	chlorinata, i. 254
Argenti nitras, i. 305	Camphora, ii. 51
nitras fusa, i. 305	Camphor, ii. 51
Armoracia, ii. 538	water, ii. 52
Arnica, i. 637 Aromatic powder, i. 500	Canella, i. 500 Cannabis Indica, i. 765
Arrow-root, i. 112	Cantharides, i. 350
Arsenic, ii. 695	Cantharidin, i. 350
iodide of, ii. 695	Cantharis, i. 350
Arsenici iodidum, ii. 695	vittata, i. 350
Arsenicum, ii. 695	Capsicum, i. 336
Asarabacca, ii. 321	Caraway, i. 503
Asarum, i. 496; ii. 821	Cardamom, i. 502
Assafœtida, ii. 24	Cardamomum, i. 502
Astringents, i. 144	Carota, ii. 535
mineral, i. 151	Carrageen, i. 103
vegetable, i. 196	Carrot seed, ii. 535
Atropia, sulphate of, i. 722	Carum, i. 503 Caryophyllus, i. 501
Atropiæ, sulphas, i. 722 Aurantii amari cortex, i. 489	Cascarilla, i. 484
dulcis cortex, i. 489	Cassava starch, i. 115
Avenæ farina, i. 110	Cassia fistula, ii. 412
Azedarach, ii. 624	marilandica, ii. 421
·	Caster, ii. 42
Balu, i. 509	Castor oil, ii. 414
Balsam of Peru, ii. 480	Castoreum, ii. 42
of Tolu, ii. 482	Catechu, i. 205
Balsamum peruvianum, ii. 480	Cathartics, ii. 374
tolutanum, ii. 482	Caustic, Filhos', i. 285
Barley, i. 111 Bath, electric, i. 556	Vienna, i. 285 Caustics, action of, i. 234
foot, i. 551	Cautery, actual, i. 541
hip, i. 552	galvanic, i. 576
vapor, i. 544	Cayenne pepper, i. 336
warm, i. 549	Centaury, American, i. 474
Baths, cold, fi. 200	Cerate of carbonate of sine, i. 196
oriental, i. 539	of subscetate of lead, i. 172
Roman, i. 539	savine, i. 349
Russian, i. 546	soap, i. 172
sand, i. 552	spermaceti, i. 122
Bean of St. Ignatius, ii. 158 Belladonna leaf, i. 721	Ceratum cetacei, i. 122 plumbi subacetatis, i. 172
root, i. 721	sabinæ, i. 349
Belladonnæ folium, i. 721	saponis, i. 172
radix, i. 721	zinci carbonatis, i. 196
Benne leaf, i. 107	Cerebro-spinal stimulants, i. 645
Benzoin, ii. 483	Cerium, oxalate of, i. 170
Benzoinum, ii. 488	Cetaceum, i. 121
Bestuscheff's nervine tincture, i. 383	Cetraria, i. 101
Bismuth, subcarbonate of, i. 169	Cevadilla, ii. 310
subnitrate of, i. 162	Chalybeate springs, i. 380
Bismuthi subcarbonas, i. 169 subnitras, i. 162	Chamomile, i. 477 Chenopodium, ii. 611
Bittersweet, i. 759	Cherry, wild, bark of, i. 464
Black drop, i. 652	Chimaphila, ii. 546
Blackberry root, i. 218	Chiretta, i. 475
Bloodroot, ii. 371	
-	Chlorine, i. 246
Borax, i. 294	, and the state of
Brayera, ii. 620	Chlorine, i. 246 water, i. 246 Chlorinium, i. 246
Brayera, ii. 620 Bromine, ii. 756	Chlorine, i. 246 water, i. 246 Chlorinium, i. 246 Chloroform, commercial, ii. 103
Brayera, ii. 620	Chlorine, i. 246 water, i. 246 Chlorinium, i. 246

Emplastrum—	Extract—
saponis, i. 172	of liquorice, i. 134
Emulsion of bitter almonds, i. 120	of logwood, i. 210
of sweet almonds, i. 118 Endermic method, i. 59	of opium, i. 651 of quassia, i. 474
Enema aloës, ii. 393	of rhatany, i. 215
assafætidæ, ii. 393	of stramonium, i. 745
catharticum, ii. 393	Extractum aconiti alcoholicum, ii. 253
colocynthidis, ii. 393	belladonnæ, i. 721
commune, ii. 393	alcoholicum, i. 721
Enemata, cathartic, ii. 392	buchu fluidum, ii. 542
Epithem, cold, ii. 201	cannabis purificatum, i. 766
Ergot, ii. 580 Ergota, ii. 580	cimicifugæ fluidum, ii. 472 cinchonæ, i. 415
Ergotin, ii. 581	fluidum, i. 416
Erigeron, ii. 540	colchici aceticum, ii. 562
Erigeron Canadense, ii. 540	radicis fluidum, ii. 562
ERRHINES, ii. 321	seminis fluidum, ii. 562
Ether, ii. 73	colocynthidis alcoholicum, ii. 427
compound spirit of, ii. 79	compositum, ii. 428
spirit of nitrous, ii. 135 stronger, ii. 73	conii, ii. 263 alcoholicum, ii. 263
Etherisation, ii. 79	fluidum, ii. 263
Eupstorium, i. 481	dulcamaræ, i. 759
EVACUANTS, ii. 316	fluidum, i. 760
EXPECTORANTS, ii. 466	ergotæ fluidum, ii. 581
Extract, acetic, of colchicum, ii. 562	gentianæ, i. 471
alcoholic, of aconite, ii. 253	fluidum, i. 471
of belladonna, i. 721 of black hellebore, ii. 455	glycyrrhisse, i. 134 hæmatoxyli, i. 210
of colocynth, ii. 427	hellebori alcoholicum, ii. 455
of hemlock, ii. 263	hyosoyami, i. 714
of henbane, i. 714	alcoholicum, i. 714
of nux vomica, ii. 145	fluidum, i. 714
of rhubarb, ii. 422	ipecacuanhæ fluidum, ii. 361
of stramonium, j. 745	jalapæ, ii. 431 juglandis, ii. 427
compound, of colocynth, ii. 428 fluid, compound, of sarsaparilla, ii. 789	lupulinæ fluidum, i. 755
of black pepper, i. 518	nucis vomicæ alcoholicum, ii. 145
of buchu, ii. 542	opii, i. 651
of chamomile, i. 480	quassise, i. 474
of cinchons, i. 416	rhei alcoholicum, ii. 422
of colchicum root, ii. 562	fluidum, ii. 423
of colchicum seed, ii. 562 of dandelion, ii. 539	sarsaparillæ fluidum, ii. 789 fluidum, compositum, ii. 789
of dulcamara, i. 760	sennæ fluidum, ii. 420
of ergot, ii. 581	serpentarize fluidum, ii. 506
of gentian, i. 471	spigelize et sennæ fluidum, ii. 622
of ginger, i. 528	stramonii alcoholicum, i. 745
of hemlock, ii. 263	stramonii, i. 745
of henbane, i. 714 of ipecacuanha, ii. 361	fuidum, ii. 539
of lupulin, i. 755	uvæ ursi fluidum, ii. 544
of prunus, i. 466	valerianse fluidum, ii. 33
of rhubarb, ii. 423	singiberis fluidum, i. 528
of sarsaparilla, ii. 789	
of senna, ii. 420	FABA Sancti Ignatii, ii. 158
of serpentaria, il. 506	Fennel, i. 505
of spigelia and senna, ii. 622 of uva ursi, ii. 544	Fern, male, ii. 608 Ferri acetas, i. 383
of valerian, ii. 33	bromidum, i. 384
of belladonna, i. 721	chloridum, i. 383
of bittersweet, i. 759	citras, i. 382
of butternut, ii. 427	et ammoniæ citras, i. 382
of chamomile, i. 480	tartras, i. 382
of cinchona, i. 415 of dandelion, ii. 539	et potassæ tartras, i. 382 et quiniæ citras, i. 382
of gentian, i. 471	ferrocyanidum, i. 384
of hemlock, ii. 263	iodidum, i. 384
of hemp, purified, i. 766	lactas, i. 383
of henbane, i. 714	oxidum hydratum, i. 379
of islan, ii. 431	phosphas, i. 381

Injections, warm, i. 552	Lead-
Insolation, i. 536	iodide of, i. 171
Iodine, ii. 720	nitrate of, i. 173
Iodinium, ii. 720	oxide of, i. 171
Ipecacuanha, ii. 361	Lemon-juice, ii. 218
compound powder of, i. 651 Irish moss, i. 103	Lenitives, i. 93
Iron, i. 378	amylaceous, i. 110 fatty and oleaginous, i. 116
acetate of, i. 383	gelatinous, i. 127
and ammonia, citrate of, i. 382	mucilaginous, i. 98
tartrate of, i. 382	saccharine, i. 133
and potassa, tartrate of, i. 382	Leopard's bane, i. 637
and quinia, citrate of, i. 382 bromide of, i. 384	Lime, i. 298
chloride of, i. 388	carbonates of, i. 298 chlorinated, i. 254
citrate of, i. 382	water, i. 298
compound mixture of, i. 380	Limonis succus, ii. 218
pills of, i. 380	Liniment, camphor, ii. 410
dried sulphate of, i. 381	limewater, ii. 410
ferrocyanide of, i. 384	soap, ii. 52
filings, i. 379 hydrated oxide of, 379	Linimentum calcis, ii. 410 camphoræ, ii. 410
iodide of, i. 384	saponis, ii. 52
in natural mineral waters, i. 380	Linum, i. 104
lactate of, i. 383	Liquor ammonim acetatis, ii. 495
muriated tincture of, i. 384	arsenici et hydrargyri iodidi, ii. 636, 696
phosphate of, i. 381	ferri nitratis, i. 381
pills of carbonate of, i. 380 precipitated carbonate of, i. 380	subsulphatis, i. 381
pyrophosphate of, i. 381	hydrargyri nitratis, ii. 637 iodinii compositus, ii. 722
reduced, i. 379	morphiæ sulphatis, i. 654
solution of nitrate of, i. 381	plumbi subacetatis, i. 172
subsulphate of, i. 381	potassæ, i. 278
subcarbonate of, i. 380	arsenitis, ii. 696
sulphate of, i. 381 syrup of iodide of, i. 384	citratis, ii. 498 sodæ chlorinatæ, i. 251
tincture of chloride of, i. 384	Liquorice root, i. 133
valerianate of, i. 383	Lobelia, ii. 280
wine of, i. 382	Logwood, i. 209
Irrigation, ii. 201	Lugol's solution, ii. 722
Irritants, i. 220	Lupulin, i. 754
alkaline, i. 270 animal, i. 350	MACE, i. 509
depletory action of, i. 232	Macis, i. 509
escharotic action of, i. 234	Madder, ii. 603
mineral, i. 235	Magnesia, ii. 400
vegetable, i. 331	carbonate of, ii. 402
Irritation, counter-, i. 222, 229	sulphate of, ii. 403
medicinal, i. 221 Isinglass, i. 128	Magnesiæ carbonas, ii. 402
Isingless, i. 120	sulphas, ii. 403 Manna, ii. 411
JALAP, ii, 431	Maranta, i. 112
Jalnpa, ii. 431	Marrubium, i. 485
Juglans, ii. 427	Marshmallow, i. 100
Juniper, ii. 547	Mayapple, ii. 461
Juniperus, ii. 547	Mayor's hammer, i. 542 Medicines, shearstian of i. 49
Kamela, ii. 627	Medicines, absorption of, i. 42 conditions for, i. 48
Kino, i. 210	action of, curative, i. 67
Koosso, ii. 620	elective, i. 70
Krameria, i. 212	local, i. 36
Tanannaour's liquid i 951	remote, i. 38
LABARRAQUE'S liquid, i. 251 Lactucarium, i. 710.	specific, i. 69
Lard, i. 116	administration of, i. 83 <pre>art of prescribing, i. 87</pre>
Laudanum, i. 652	avenues by which introduced, i. 50
Sydenham's, i. 653	changes of, in the system, i. 66
Lavandula, i. 508	classification of, i. 91
Lavender, i. 508	definition of, i. 17
Lead, i. 170 acetate of, i. 172	doses of, i. 75
carbonate of, i. 173	forms of, i. 83 influences modifying the action of, i. 74
	menanna mann'imp one south of F 10

Oleum-	Pimenta, i. 514
hedeomæ, i. 507	Pimento, i. 514
juniperi, ii. 547	Piper, i. 515
lavandulæ, i. 508	Pipeigaere ii 546
menthæ viridis, i. 513 monardæ, i. 514	Pipsissewa, ii. 546 Pitch, Burgundy, i. 339
punctatæ, i. 349	Pix abietis, i. 339
morrhuæ, ii. 760	liquida, ii. 486
olivæ, ii. 408	Plaster, adhesive, i. 171
pimentæ, i. 514	litharge, i. 171
ricini, ii. 414	mercurial, ii. 633
rosmarini, i. 519	of ammoniae, ii. 477
sinapinum, ii. 333 succini, ii. 32	with mercury, ii. 477 of assafetida, ii. 25
terchinthinm, i. 613	of Burgundy pitch, i. 339
tiglii, ii. 446	of lead, i. 171
valerianæ, ii. 33	of opium, i. 653
Opium, i. 649	soap, i. 172
Orange-peel, bitter, i. 489	Plumbi acetas, i. 172
sweet, i. 489	carbonas, i. 173
Oxalate of cerium, i. 170 Orysa, i. 113	iodidum, i. 171 nitras, i. 173
01,926, 1. 110	oxidum, i. 171
PACKING in the wet sheet, ii. 204	Plumbum, i. 170
Papaver, i. 650	Podophyllin, ii. 461
Paregoric elixir, i. 652	Podophyllum, ii. 461
Parsley root, ii. 536	Poison-oak, i. 640
Partridge berry, i. 506	Pomegranate rind, ii. 616
Pennyroyal American i 507	root, bark of, ii. 616
Pennyroyal, American, i. 507 Pepo, ii. 625	Poppy, i. 650 Port wine, i. 578
Pepper, black, i. 515	Potassa, i. 278
cayenne, i. 336	acetate of, ii. 524
Peppermint, i. 511	bicarbonate of, ii. 517
Peru, balsam of, ii. 480	bitartrate of, ii. 406
Petroselinum, ii. 536	carbonate of, i. 278; ii. 517
Phosphorus, i. 642	caustic, i. 278
Picrotoxin, ii. 277 Pills, aloetic, ii. 441	chlorate of, ii. 774 cum calce, i. 278
blue, ii. 633	nitrate of, ii. 519
compound cathartic, ii. 635	pure carbonate of, i. 278; ii. 517
of iron, i. 380	solution of, i. 278
of rhubarb, ii. 423	sulphate of, ii. 405
of soap, i. 651	tartrate of, ii. 406
of squill, ii. 532	with lime, i. 278
Lady Webster's, ii. 441 of aloes and assafetida, ii. 25, 441	Potassæ acetas, ii. 524 bicarbonas, ii. 517
mastic, ii. 441	bitartras, ii. 406
myrrh, ii. 441	carbonas, i. 278; ii. 517
of assafetida, ii. 25	pura, i. 278; ii. 517
of carbonate of iron, i. 380	chloras, ii. 774
of copaiba, ii. 550	nitras, ii. 519
of galbanum, compound, ii. 25	tartras, ii. 406
of mercury, ii. 633 of opium, i. 650	Potassii bromidum, ii. 756 cyanidum, ii. 217
of rhubarb, ii. 423	iodidum, ii. 721
Pilulæ aloes, ii. 441	Potassium, bromide of, ii. 756
et assafætidæ, ii. 25, 441	cyanide of, ii. 217
et mastiches, ii. 441	iodide of, ii. 721
et myrrhæ, ii. 441	Potatoe fly, i. 350
assafætidæ, ii. 25	Potio Riverii, ii. 527
catharticæ compositæ, ii. 635 copaiba, ii. 550	Powder, compound of ipecacuanha, ii. 361, 501
ferri carbonatis, i. 380	compound of jalap, ii. 431
compositæ, i. 380	Dover's, ii. 501
galbani, compositæ, ii. 25	of aloes and canella, ii. 441
hydrargyri, ii. 633	of ipecacuanha, compound, i. 651
opii, i. 650	of iron, ii. 379
rhei, ii. 423	Precipitate, red, ii. 634
compositæ, ii. 423 saponis compositæ, i. 651	white, ii. 636 Prescribing, the art of, i. 87
scillæ compositæ, i. 477. 532	Prunus Virginiana, i. 464

```
Prussic neld, il. 205
                                                          ' Bedativer ....
Pulvia aromaticus, 1. 500
                                                               mervoue, ii. 251
     aloes et canelim, i. 507; ii. 441 Senega, ii 469 ipecacuanha compositue, i. 651; ii. 361, Seneka, ii. 469
                                                           Corpontaria, 🖟 506
     jalapæ compositus, il. 431
                       625
                      , 412
                                                           Sesami folium, i. 107
                                                                                    with, ii. 204
Quassta, i. 472
Quercus alba, i. 216
tinctoria, i. 216
                                                                                     204
                                                                                    365
                                                                                   30
                     414
                     i. 413
                                                                                   i. 108
                                                                          Canada, i. 496
                    of, i. 415
                                                         Snake-root, Virginia, ii. 506
Sneesewort, ii. 322
                  ¶ 1. 413
                    1 415
                       of, L 415
                                                           Soap cerate, i. 172
                                                                compound
Quinoidia, i. 414
                                                                                   of, t. 451
RESIN of Jalep, il. 481
     of May-apple, it. 461
                                                           Boda, acetate of, il. 527
                                                                and potessa, tartrate of, il. 408
     of scammony, ii. 434
                                                                bicarbonate of, 1. 286
Resina jalapm, ii. 431
podophylli, ii. 461
                                                                                   286
     rcammonii, it. 434
                                                                                           286
Rhatany, i. 212
Rheum, ii. 422
                                                                phosphute of, ii. 405 sulphate of, ii. 405
Rhuberb, ii. 422
                                                           Sodae acetan, il. 527
Rice, i. 113
Boobelle sait, ii. 408
Ross gallica, i. 217
Rossmary, i. 518
Roses, red, i. 217
                                                                                     284
                                                                et potasse tartras, ii. 408
Rosmarinus, i. 618
                                                                enlphae, ii. 405
Rubia tinotorum, ii. 603
                                                           Solania, i. 760
Rubus trivialis, 1. 218
                                                                                     of lodine, ii. 722
                                                           Solu
                                                                                 of lead, 1. 173
    villorus, i. 218
Ruo, 1. 519
Ruta, i. 519
                                                                                              IL 495
                                                                of The Ca
BABADILLA, IL 310
Babbatia, i 474
                                                                                            ii. 696
                                                                of
                                                                of
                                                                                            251
Sabina, i. 345
                                                                of
Baccharum, L 137
Sage, i. 523
Sage, i. 114
                                                                of ic
                                                                                   enic and mercury, ii. 636,
                                                                   696
Saint Ignatius' bean, it. 168
                                                                of lime, I. 298
Sal ammoniac, ii. 783
                                                                of nitrate of iron, i. 381
                                                                of nitrate of mercury, ii. 687 of potassa, i. 278
Salep, i 105
Salicin, i 402
Balix, 1. 461
                                                                of subacetate of lead, i. 172
                                                                of subsulphate of iron, i. 381
Balvia, 1, 523
Sambucus, i. 525
Sanguinaria, ii. 371
                                                                of sulphate of morphia, i. 864
                                                           Spearmint, i. 513
                                                          Spermaceti, i 121
cerate, i. 122
Spigelia, ii. 622
                 alin, i. 106
                                                          Spinants, ii. 143
     plth, i. 166
                                                           Spirit, compound, of ether, ii. 79
                                                                     of juniper, ii. 546
of lavender, i. 508
     radicis sortex, it. 505
root, bark of, ii. 505
Savine, i. 845
                                                                of anise, i. 495
Seammonium, il 434
                                                                of emphor, ii. 52
Beammony, ii. 434
Seilla, ii. 531
                                                                of cinnamon, i. 508
of invender, i. 508
                                                                of Mindererus, il. 495
                                                                of nitrous ether, ii. 135, 499
                                                                of nutmeg, i. 511
     general, ii. 159
                                                                of peppermint, i 512
```

VOL. 31.—51

Spirit—	Syrupue-
of spearmint, i. 513	zingiberis, i. 528
Spiritus setheris compositus, ii. 79	
nitrosi, ii. 135, 499	TABACUN, ii. 284
anisi, i. 495	Tamarind, ii. 413
camphoræ, ii. 52 cinnamomi, i. 500	Tamarindus, ii. 413 Tanacetum, ii. 615
juniperi compositus, il. 548	Tansy, ii. 615
lavandulæ, i. 508	Tapioca, i. 114
compositus, i. 508	Tar, ii. 486
menthæ piperitæ, i. 512	Taraxacum, ii. 538
menthæ viridis, i. 513	Tartar emetic, ii. 339
myristicæ, i. 511	Terebinthina oleum, i. 613
Squill, ii. 531	Tetanica, ii. 143
Stanni pulvis, ii. 606	Theriscs, i. 677
Starch, i. 110 iodised, ii. 723	Thoroughwort, i. 481 Tin, powder of, ii. 607
Stimulants, cerebro-spinal, i. 644	Tinctura aconiti folii, ii. 253
general, i. 529	radicis, ii. 253
tonic and aromatic, i. 492	aloes, ii. 441
Stramonii folium, i. 744	et myrrhæ, ii. 441
semen, i. 744	arnicæ, i. 640
Stramonium leaf, i. 744	assafœtidæ, ii. 25
seed, i. 744	belladonnæ, i. 722
Strychnia, ii. 145	benzoini composita, ii. 484
sulphate of, ii. 145	cannabis, i. 766
Strychniæ sulphæs, ii. 145 Substitution, i. 226	cardamomi, i. 502 composita, i. 502
Succinum, ii. 31	castorei, ii. 45
Suet, i. 127	catechu, i. 207
Sugar, i. 137	cinchonæ, i. 416
Sulphur, iodide of, ii. 722	composita, i. 416
lotum, ii. 394	cinnamomi, i. 500
precipitated, ii. 395	colchici, ii. 562
præcipitatum, ii. 395	conii, ii. 263
aublimatum, ii. 394	cubebæ, il. 557
sublimed, ii. 394 washed, ii. 394	digitalis, ii. 223 ferri chloridi, i 384
Sulphuris iodidum, ii. 722	gentianse composita, i. 471
Suppositories of cocos butter, i. 127	guaisci, ii. 502
purgative, ii. 394	ammoniata, ii. 502
Sweet flag, i. 488	hellebori, ii. 455
spirit of nitre, ii. 499	hyoscyami, i. 714
Syrup, aromatic, of rhubarb, ii. 423	iodinii, ii. 721
compound, of sarsaparilla, ii. 789	composita, ii. 721
compound, of squill, ii. 532 hive, ii. 532	jalapæ, ii. 431 lobeliæ, ii. 280
of garlic, ii. 474	lupulinæ, i. 755
of ginger, i. 528	melampodii, ii. 455.
of gum Arabic, i. 99	myrrhæ, ii. 478
of iodide of iron, i. 384	nucis vomices, ii. 145
of ipecacuanha, ii. 361	opii, i. 652
of orange-peel, i. 490	acetata, i. 652
of rhatany, i. 215	camphorata, i. 652
of rhubarb, ii. 423	deodorata, i. 653
of seneka, ii. 470 of squill, ii. 532	quassise, i. 474 rhei, ii. 423
of tolu, ii. 483	et sennæ, ii. 420, 423
Syrupus acacise, i. 99	sanguinarie, ii. 372
alli, ii. 474	soillæ, ii. 532
amygdalæ, i. 120	serpentariæ, ii. 506
aurantii corticis, i. 490	stramonii, i. 745
ferri iodidi, i. 384	tolutana, ii. 483
ipecacuanhæ, ii. 361	valerianæ, ii. 33
rhei, ii. 423 rhei aromaticus, ii. 423	ammoniata, ii. 33
sarsaparillæ compositus, ii. 789	singiberis, i 528 Tineture, ammoniated, of guaise, ii. 502
scille, ii. 532	of valerian, ii. 33
compositus, ii. 532	Bestuscheff's nervine, i. 383
senegæ, ii. 470	compound, of benzoin, ii. 484
tolutanus, ii. 483	of cardamom, i. 502

Tineture, compound—	Unguentum hydrargyri-		
of cinchous, i. 416	ammoniati, ii. 635		
of gentian, i. 471 of iodine, ii. 721	nitratis, ii. 637 oxidi rubri, ii. 634		
muriated, of iron, i. 384	iodinii, ii. 722		
of aconite leaf, ii. 253	compositum, ii. 722		
root, ii. 253	plumbi carbonatis, i. 173		
of aloes, ii. 441	picis liquidæ, ii. 486		
and myrrh, ii. 441	potassii iodidi, ii. 722		
of arnica, i. 640	stramonii, i. 745 sulphuris iodidi, ii. 722		
of assnfetida, ii. 25 of belladonna, i. 722	veratriæ, ii. 316		
of black hellebore, ii. 455	zinci oxidi, ii. 138		
of bloodroot, ii. 373	Uva ursi, ii. 543		
of cardamom, i. 502			
of castor, ii. 45	VALBRIAN, ii. 32		
of catechu, i. 207	Valeriana, ii. 32		
of chloride of iron, i. 384 of cinchonia, i. 416	Vallet's ferruginous pills, i. 381 Vapor bath, Russian, i. 546		
of cinnamon, i. 500	Veins, medicines administered by, i. 51		
of colchicum, ii. 562	Veratria, ii. 310		
of conium, ii. 263	Veratrum album, ii. 308		
of cubeb, ii. 557	viride, ii. 244		
of digitalis, ii. 223	Vinegar, i. 235		
of ginger, i. 528	of colchicum, ii. 562		
of guaiac, ii. 502 of hemp, i. 766	of opium, i. 652 of squill, ii. 532		
of hyoscyamus, i. 714	Vinum, i. 578		
of iodine, ii. 721	aloes, ii. 441		
of jalap, ii. 431	antimonii, ii. 339		
of lupulin, i. 755	colchici radicis, ii. 562		
of musk, ii. 51	colchici seminis, ii. 562		
of myrrh, ii. 478	ergotæ, ii. 581		
of nux vomica, ii. 145 of opium, i. 652	ipecacuanhæ, ii. 362 opii, i. 653		
acetated, i. 652	portense, i. 578		
camphorated, i. 652	rhei, ii. 423		
deodorized, i. 653	tabaci, ii. 285		
of quassia, i. 474	xericum, i. 578		
of rhatany, i. 215	W		
of rhubarb, ii. 423	WARNER'S gout cordial, ii. 420		
and senna, ii. 420, 423 of serpentaria, ii. 506	Water, camphor, ii. 52 chlorine, i. 246		
of squill, ii. 532	cinnamon, i. 500		
of stramonium, i. 745	cold, ii. 160		
of tolu, ii. 483	fennel, i. 506		
of valerian, ii. 33	lime, i. 298		
of veratrum viride, ii. 244	of ammonia, i. 270		
Tobacco, ii. 284 Tonics, i. 375	peppermint, i. 512		
simple, bitter, i. 467	spearmint, i. 513 warm and hot, i. 548		
specific, i. 378	Wild cherry bark, i. 464		
stimulant, i. 476	Willow bark, i. 461.		
Toxicodendron, i. 640	Wine, manufacture of, i. 581		
Tragacanth, i. 107	of aloes, ii. 441		
Tragacantha, i. 107	of antimony, ii. 339		
Troches of bicarbonate of soda, i. 294 of ipecacuanha, ii. 361	of colchicum root, ii. 562		
of liquorice and opium, i. 651	of colchicum seed, ii. 562 of ergot, ii. 581		
of peppermint, i. 512	of ipecacuanha, ii. 362		
Trochisci glycyrrhize et opii, i. 651	of opium, i. 653		
ipecacuanhæ, ii. 361	of rhubarb, ii. 423		
menthæ piperitæ, i. 512	of tobacco, ii. 285		
sodæ bicarbonatis, i. 294	port, i. 578		
Turpentine, oil of, i. 613 Turpeth mineral ii 637	sherry, i. 578		
Turpeth mineral, ii. 637	warieties of, i. 580 Wormseed, ii. 611		
Ulmus, i. 108	Wormwood, ii. 618		
Unguentum aquæ rosæ, i. 122			
benzoini, ii. 484	XANTEOBRHIZA, i. 476		
gallæ, i. 208			
hydrargyri, ii. 634	YELLOW ROOT, i. 476		

ZATZE, ii. 628
Zinc, acetate of, i. 195
chloride of, i. 328
oxide of, ii. 138
precipitated carbonate of, i. 195
sulphate of, ii. 335
valerianate of, ii. 141

Zinci acetas, i. 195
carbonas precipitatus, i. 195
chloridum, i 328
oxidum, ii. 138
sulphas, ii 335
valerianas, ii. 141
Zingiber, i. 526

INDEX OF THERAPEUTICS.

Abortion, cantharis, i. 367	Amenorrhœa—		
opium, i. 703	tanacetum, ii. 616		
Abrasions, calx, i. 301	Anasarca, iodinium ii. 744		
Abscess, cantharis, i. 369	vapor bath, i. 548		
iodinium, ii. 753	vid. Dropsy.		
potassa, i. 282	Anchylosis, frigus, ii. 196		
Abscess, mammary, acetum, i. 241	Anemia, ferrum, i. 394		
antimonii et potassæ tartras, ii. 356	frigus, ii. 185		
oleum ricini, ii. 418.	Aneurism, electricity, i. 575		
Absorption, by skin, i. 49.	ferrum, i. 408		
by veins or lacteals, i. 46	frigus, ii. 196		
changes in medicines after, i. 66	plumbum, i. 187		
conditions for, i. 48	veratrum viride, ii. 250		
modifying, i. 49	Angina maligna, capsicum, i. 338		
of medicines, i. 42	Angina pectoris, acidum hydrocyanicum di-		
Acidity, gastric, sodn, i. 290	lutum, ii. 214		
of stomach, magnesia, ii. 401	chloroformum, ii. 127		
Acids, poisoning by, magnesia, ii. 402	electricity, i. 570		
Acne, hydrargyrum, ii. 690	iodinium, ii. 745		
sulphur, ii. 399	Anus, fissure of, acidum tannicum, i. 201		
After-pains, anthemis, i. 479	belladonna, i. 730		
Albuminuria, acid. gallic., i. 204	galla, i. 208		
acid. tannicum, i. 201	glycerina, i. 124		
ferrum, i. 402	krameria, i. 214		
Alcoholic intoxication, ammonia, i. 612	spasm of, belladonna, i. 731		
Alcoholism, chron., sinci oxidum, ii. 140	Aphonia, alumen, i. 159		
Alopecia, cantharis, i. 361	argenti nitras, i. 316		
Amaurosis, æther, ii. 78	cinchona, i. 448		
antimonii et potassæ tartras, ii. 357	electricity, i. 567		
aqua ammonise, i. 275	iodinium, ii. 748		
electricity, i. 567	zingiber, i. 528		
nux vomica, ii. 150	Aphthæ, acidum tannicum, i. 202		
Amenorrhœa, aloes, ii. 446	calx, i. 303		
ammonise murias, ii. 786	geranium, i. 208		
anthemis, i. 479	mel, i. 137		
apiol, ii. 538	potassæ chloras, ii. 778		
aqua ammonise, i. 275	rosa gallica, i. 218		
argenti nitras, i. 310	saccharum i. 143		
arsenicum, ii. 716	salvia, i. 524		
cantharis, i. 360	sodæ boras. i. 296		
colocynthis, ii. 430	zinci sulphas, ii. 336		
electricity, i. 572	Apoplexy, cantharis, i. 361		
ergota, ii. 598	colocynthis, ii. 430		
ferrum, i. 395	iodinium, ii. 744		
guaiacum, ii. 504	oleum tiglii, ii. 453		
hedeoma, i. 507	Arsenic, poisoning by, calx, i. 304		
helleborus, ii. 457	magnesia, ii. 402		
iodinium, ii. 746	Arthritis, oleum morrhuæ, ii. 767		
myrrha, ii. 480	Ascarides, acetum, i. 241		
ol. terebinthinæ, i. 620	allium, ii. 476		
ricinus, ii. 419	æther, ii. 77		
rosmarinus, i. 519	aqua calcis, i. 301		
rubia tinctorum, ii. 603	aloe, ii. 445		
ruta, i. 522	quassia, i. 474		
sabina, i. 347	tabacum, ii. 306		
senega, ii. 471	Ascites, digitalis, ii. 236		
sodæ boras, i. 297	elaterium, ii. 461		

Ascites—	Bronchitis—
erigeron, ii. 541	bensoinum, ii. 485
iodinium, ii. 751 sambucus, i. 526	cantharis, i. 365 cetaceum, i. 121
Asphyxia, electricity, i. 574	chloroformum, ii. 124
tabacum, ii. 307	cimicifuga, ii. 473
Asthma, acid. hydrocyanicum dilutum, ii. 214	copaiba, ii. 555
arsenicum, ii. 716	cubeba, ii. 560
assafœtida, ii. 28 belladonna, i. 736	dracontium, ii. 31 dulcamara, i. 765
chloroformum, ii. 125	glycyrrhisa, i. 134
dracontium, ii. 31	hordeum, i. 112
etherization, ii. 98	ipecacuanha, ii. 365
iodinium, ii. 745	linum, i. 105
ipecacuanha, ii. 366 lobelia, ii. 281	lobelia, ii. 283 myrrhæ, ii. 479
opium, i. 695	oleum morrhuse, ii. 772
potasse nitras, ii. 523	ricini, ii. 418
stramonium, i. 749	tiglii, ii. 454
tabacum, ii. 307	opium, i. 694
veratrum viride, ii. 249	pix liquida, ii. 487
Ataxia, camphora, ii. 65 moschus, ii. 48	saccharum, i. 142 sanguinaria, ii. 372
progressive locomotor, argenti nitras, i.	scilla, ii. 534
311	senega, ii. 471
valeriana, ii. 48	succinum, ii. 32
7	sulphur, il. 399
BARRENNESS, iodinium, ii. 746	taraxacum, ii. 540
Belladonna, poisoning by, opium, i. 743 Biliary concretions, æther, ii. 77, 99	tragacantha, i. 108 ulmus, i. 109
ol. terebinthinæ, i. 620	uva ursi, ii. 545
Biliary disorder, cathartics, ii. 386	chronic, acidum tannicum, i. 199
anthemis, i. 480	ammoniacum, ii. 477
potasse acetas, ii. 526	ammoniæ carbonas, i. 634
Bites and stings, acidum nitricum, i. 245 ammoniæ carbonas, i. 634	anisum, i. 495
of venomous animals, alcohol, i. 611	calx, i. 301 calx chlorinata, i. 257
Bladder, catarrh of, soid. tannic., i. 202	cantharis, i. 358
buchu, ii. 542	cetraria, i. 102
calx, i. 304	chiretta, i. 475
cantharis, i. 359 copaiba, ii. 554	chondrus, i. 103
iodinium, ii. 748	cinchona, i. 456 cuprum ammoniatum, ii. 137
juniperus, ii. 548	marrubium, i. 486
myrrha, ii. 480	oleum morrhuse, ii. 772
pix liquida, ii. 487	pix liquida, ii. 487
uva ursi, ii. 544	plumbum, i. 191
chronic infl. of, argenti nitras, i. 323 irritable, benzoinum, ii. 485	sinapis, i. 335 Bronchorrhœa, creasotum, i. 627
ulmus, i. 109	Bruises, acetum, i. 240
paralysis of, cantharis, i. 359, 367	arnica, i. 639
ergota, ii. 599	camphora, ii. 71
ol. terebinthines, i. 620	Bubo, cantharis, i. 369
Blistering by nitrate of silver, i. 319 Boils, humulus, i. 759	Burns, acetum, i. 240 alcohol, i. 612
mel, i. 137	aqua ammonise, i. 275
potassa, i. 284	argenti nitras, i. 321
potassæ acetas, ii. 526	calx, i. 301
Bowels, chronic fluxes of, cantharis, i. 366	creasotum, i. 628
Brain, affections of, cantharis, i. 363 congestion of, assafætida, ii. 30	frigus, ii. 194 gossypium, ii. 602
elaterium, ii. 460	oleum olivæ, ii. 410
diseases of, cathartics, ii. 389	ol. terebinthinse, i. 622
inflam. of, frigus, ii. 183	plumbum, i. 192
Breath, foul, calx chlorinata, i. 259	
Bronchitis, acute, allium, ii. 476	CALCULI, pain from, etherization, ii. 99 Calculous disease, acidum muriaticum, i. 265
alumen, i. 157 ammoniacum, ii. 477	uva ursi, ii. 544
ammoniae muriae, ii. 786, 787	Cancer, arsenicum, ii. 716
angelica, i. 492	conium, ii. 270
assafontida, ii. 28	ferrum, i. 405
balsamum peruvianum, ii. 481	iodinium, ii. 740

Cancer—	Chorea-
potassa, i. 282	zinci sulphas, ii. 338
zinci chloridum, i. 329	Clinical observation the basis of therapeutics
Cancrum oris, ammoniæ carbonas, i. 635 potassæ chloras, ii. 778	i. 32 Colic, sether, ii. 75
zinci sulphas, ii. 336	balsamum peruvianum, ii. 482
Carbuncle, ol. terebinthinse, i. 623	cardamomum, i. 502
potassa, i. 283	chloroformum, ii. 129
collodium, i. 130	fæniculum, i. 505
Caries, acid. nitric., i. 246	hepatic, etherization, ii. 99
dental, collodium. i. 131 oleum morrhum, ii. 767	lavandula, i. 508 lead, acid. aceticum, i. 239
Catarrh, liquor ammoniss acetatis, ii. 497	acid. sulphurie., i. 268
gastrie, alumen, i. 155	alumen, i. 154
of bladder, copaiba, ii. 554	magnesiæ sulphas, ii. 404
of throat, &c., aqua ammoniæ, i. 275	oleum ricini, ii. 417
Cephalalgia, acid. aceticum, i. 241	oleum tiglii, ii. 452
aconitum, ii. 261 æther, ii. 78	nux vomica, ii. 154 tabacum, ii. 306
aqua ammonise, i. 274	magnesia, ii. 401
camphora, ii. 69	mentha piperita, i. 512
potassii cyanidum, ii. 217	nephritic, etherization, ii 99
valeriana, ii. 39	ol. cajuputi, i. 497
vid. Headache.	opium, i. 700
Cerumen, glycerina, i. 124 Chancres, argenti nitras, i. 320	ruta, i. 522 zingiber, i. 528
Chapped hands, glycerina, i. 125	Condylomata, acid. nitricum, i. 246
skin, benzoinum, ii. 485	creasotum, i. 629
Chilblains, acidum muriaticum, i. 262	Congestion, frigus, ii. 181
acidum nitricum, i. 245	Conium, poisoning by, alcohol, ii. 276
chlorinium, i. 250	Conjunctivitis, alcohol, i. 612
copaiba, ii. 556 creasotum, i. 628	argenti nitras, i. 318 cinchona, i. 440
Chloasma, hydrargyrum, ii. 689	cupri sulphas, i. 327
Chlorosis, ferrum, i. 394	opium, i. 706
frigus, ii. 185	plumbi acetas, i. 193
sabina, i. 348	sassafras medulla, i. 106
Cholera, epidemic, acidum sulphuric., i. 268	Zinci acetas, i. 195
æther, ii. 76 argenti nitras, i. 310	Constipation, aloe, ii. 445 alumen, i. 155
hydrargyrum, ii. 687	avenæ farina, i. 110, 111
nux vomica, ii. 156	belladonna, i. 732
opium, i. 699	cathartics, ii. 383
infantum, monarda, i. 514	electricity, i. 571
potasse chloras, ii. 781	frigus, ii. 190
warm bath, i. 551 morbus, acid. sulphurie., i. 268	jalapa, ii. 433 magnesiæ sulphas, ii. 404
calumba, i. 469	nux vomica, ii 155
opium, i. 698	oleum ricini, ii. 417
tabacum, ii. 306	terebinthinæ, i. 619
Chordee, brominium, ii. 760	tiglii, ii. 452
camphora, ii 72	pix liquida, ii. 487
lupulin, i. 758 opium, i. 703	podophyllum, ii. 464 senna, ii. 421
Chorea, antimonii et potasse tartras, ii. 357	tabacum, ii. 304
argenti nitras, i. 310	Contusions, acetum, i. 240
arsenicum, ii. 714	alcohol, i. 611
assafœtida, ii. 30	ammoniæ murias, ii. 786
cannabis indica, i. 774	arnica, i. 639
cathartics, ii. 390 chloroformum, ii. 126	camphora, ii. 71 frigus, ii, 192
cimicifuga, ii. 473	liquor ammonise acetatis, ii. 498
cuprum ammoniatum, ii. 137	oleum oliviæ, ii. 410
electricity, 1. 570	plumbum, i. 193
ferrum, i. 400	Convulsions, balsam. peruvianum, ii. 482
frigus, ii. 188 iodinium, ii. 746	brominium, ii. 760
nux vomica, ii. 153	cantharis, i. 369 etherization, ii. 98
oleum morrhuæ, ii. 772	warm bath, i. 551
opium, i. 690	zinci oxidum, ii. 139
valeriana, ii. 41	infantile, chloroformum, ii. 128
zinci oxidum, ii. 140	

Convulsions-	Diabetes-
puerperal, ammonize carbonas, i. 635	ammonise carbonas, i. 635
antimonii et potassæ tartras, ii. 358	antimonii et potasses tartras, ii. 357
chloroformum, ii. 127 frigus, ii. 189	calx, i. 804 creasotum, i. 627
Cornes, iron in, iodinium, ii. 749	kino, i. 212
opacity of, electricity, i. 575	magnesia, ii. 402
Corns, argenti nitras, i. 324	opium, i. 704
creasotum, i. 629	eaccharum, i. 142
iodinium, ii. 748 Corysa, ammoniæ carbonas, i. 636	soda, i. 291 Diabetes insipidus, cantharis, i. 359
ammonise murias, ii. 787	Diarrhosa, acacia, i. 99
camphora, ii. 72	acidum sulphuricum, i 268
chronic, acidum tannic., i. 201	acidum tannicum, i. 199
Cough, acid. hydrocyanic. dilut., ii. 214	alcohol, i. 609
belladonna, i. 734	argenti nitras, i. 309
lactucarium, i. 713 opium, i. 693	balsamum peruvianum, ii. 481 bismuthi subnitras, i. 167
spiritus ætheris nitrosi, ii. 500	calx, i. 302
tabacum, ii. 301	cantharis, i. 366
zinci valorianas, ii. 141	catechu, i. 206
Counter-irritation, ammonia, i. 274	cathartics, ii. 386
cantharis, i. 256	cetraria, i. 102
sinapis, i. 335 Coxalgia, potassa, i. 282	cinnamomum, i. 499 cupri sulphas, i. 327
Cramp in stomach, valerians, ii. 40	erigeron, ii. 541
Croup, alumen, i. 156	ferrum, i. 402
antimonii et potasse tartras, ii. 355	galla, i. 208
argenti nitras, i. 311	geranium, i. 208
cupri sulphas, i. 327 hydrargyrum. ii. 684	granatum, ii. 618 hæmatoxylon, i. 210
lobelia, ii. 283	hordeum, i. 112
potassa, i. 284	ichthyocolla, i. 128
potasse chloras, ii. 779	ipecacuanha, ii. 367
sanguinaria, ii. 372	kino, i. 211
scilla, ii. 534	maranta, i. 113
senega, ii. 471 spasmodic, moschus, ii. 50	nux vomica, ii. 156 oleum ricini, ii. 417
tabaoum, ii. 301	opium, i. 696
zinci sulphas, ii. 337	orysa, i. 114
vid. Laryngitis.	plumbum, i. 190
Cure of disease, what, i. 23	quercus, i. 216
Cyanosis, potassæ chloras, ii. 781 Cystitis, cubeba, ii. 560	rheum, ii. 425 rubus, i. 218
chronic, argenti nitras, i. 323	sago, i. 114
Cysts, iodinium, ii. 753	salep, i. 106
	sesami folium, i. 107
DEAFMESS, sether, ii. 78	tapioca, i. 115
ereasetum, i. 628	ulmus, i 109
glycerina, i. 124 ol. cajuputi, i. 497	Diphtheria, acid. muriatioum, i. 262 allium, ii. 476
terebinthinæ, i. 623	alumen, i. 159
Deafness, nervous, electricity, i. 568	ferrum, i. 410
Debility, alcohol, i. 606	guaiscum, ii. 505
vinum, i. 588	potasse chloras, ii. 779, 782
Delirium, æther, ii. 78 tremens, alcohol, i. 610	zinci sulphas, ii. 337
anthemis, i. 480	Disease, crises in, i. 25, 26 cure of, i. 23
antimonii et potasses tartras, ii. 358	feigned, etherisation, H. 99
cannabis Indica, i. 775	limits of curability of, i. 25
chloroformum, ii. 126	local causes of, i. 24
cinchona, i. 448	nature's power in, i. 23
digitalis, ii. 241 etherization, ii. 99	observation of, i. 28 spontaneous cure of, i. 26
frigus, ii. 187	Diseases of the nervous system, opium, i. 687
humulus, i. 758	simulated, chloroformum, ii. 129
opium, i 689	Dislocations, antimonii et potasses tartras, ii.
sinapis, i. 334	359
valeriana, ii. 40 vinum, i. 589	chloroformum, ii. 46 etherisation, ii. 93
Diabetes, acid. nitrioum, i. 245	tabacum, ii. 301
alumen, i. 155	Dropped hands, electricity, i. 566

11. 69 L

B. 214

Dropay, alcohol, i. 611 allium, ii. 476 1 Dysmenorrhosetherization, ii. 99, 129 antimonli et potassen tartras, Il. 356 **196 662** armoracia, il. 529 buchu, ii. 542 cantharis, i. 358, 361 carota, ii. 536 scetatie, ii. 497 entharties, ii. 388 i. 512 naz vomica, il. 154 colocynthis, ii. 480 einahona, i. 489 digitalin, ii. 236, 242 digitalin, ii. 283 rute, i. 522 eabina, l. 347 sodse boras, I. 297 4. 619 i. 261 i. 268 231 tannicum, 1. 199 iodinium, ii. 743 allium, il. 475 aloes, il 445 1. 484 acetatis, il. 498 i. 620 308 W 7 126 calamus, i. 489 07 calumba, i. 469 carbonas, i 284 chloras, ii. 781 nitras, ii. 523 capsioum, i. 837 chirotta, i. 475 chenopodium, ii. 613 saccharum, i. 142 cinchona, i. 457 reilla, ii. 534 supatorium, i 482 ferrum, i. 401 gentians, i. 471 humulus, i. 757 ipecaeuanha, ii. 367 il. 136, 500 tabacum, u. ovó marrubium, i 496 millefolium, i. 487 nva ursi, il. 545 B. 744 M. WI. nitrioum, L 244 155 slumen, i. 155 poteres, 1. 284 quassia, i. 473 rheam, ii. 425 amylum, i. 118 angustura, i. 484 372 sinapis, 1. 334 soda, 1. 289 spigelia, ii. 623 arnica, i. 539 blemuthi sabnitres, l. 168 calumba, i. 469 cuntharis, i 366 ossenrilla, i. 485 tarazneum, il. 540 einei sulphas, ii. 338 cinchona, i. 457 copaiba, ii. 555 hydrocyanicum dilutum, glycerina, i. 123 goreypium, ii. 602 hydrargyrum, ii. 685 Strangury. ichthyocolla, l. 128 lodinium, il. 749 BARACHE, mther, ii. 78 li. 367 ЯÌ li. 404 i. 366 100 i. 619 ferram, i 408 pix ii. 488 Ectema, i. 358 1229 um, i. 243 Effevia, 258 337 Dysmenorrhes, arsenioum, ii. 716 belladonna, i. 732 cantharis, i. 367

eastoreum, il. 44

Entropion, acid. sulphuricum, i. 268	Fever, intermittent—
Epilepsy, ammonise carbonas, i. 635	anthemis, i. 479
antimonii et potassæ tartras, ii 357 aqua ammoniæ, i. 276	antimonii et potassæ tartras, ii. 350. arnica, i. 639
argenti nitras, i. 310	arsenicum, ii. 709
belladonna, i. 735	capsicum, i. 338
brominium, ii. 759	cascarilla, i. 485
cinchona, i. 447	chloroformum, ii. 124
cuprum ammoniatum, ii. 137	cinchona, i. 432
digitalis, ii. 241	cornus Florida, i. 463
hyoscyamus, i. 719 nux vomica, ii. 153	cupri sulphas, i. 327
oleum terebinthinæ, i. 621	eupatorium, i. 481 ferrum, i. 401
tiglii, ii. 453	frigus, ii. 180
opium, i. 690	nux vomica, ii. 154
plumbum, i. 192	opium, i. 684
stramonium, i. 749	petroselinum, ii. 537
tabacum, ii. 301	piper, i. 517
valeriana, ii. 35 sinci oxidum, ii. 139	quassia, i. 473 salix, i. 462
Epistaxis, alumen, i. 158	nervous state of, moschus, ii. 48
catechu, i. 206	valeriana, ii. 41
cantharis, i. 361	puerperal, ferrum, i. 406
ergota, ii. 597	ol. terebinthinse, i. 617. 622
frigus, ii. 185	remittent, acid. nitric., i. 243
zinci sulphas, ii. 337	cinchona, i. 438
Eruptions, cutaneous, plumbum, i. 193 vid. Skin, diseases of.	ipecacuanha, ii. 370
Eruptive fevers, liquor ammonise acetatis, ii.	serpentaria, ii. 507 scarlet, adeps, i. 117
497	einchona, i. 455
Erysipelas, argenti nitras, i. 322	ferrum, i. 406
camphora, ii. 71	typhus, acid. nitrioum, i. 243
cantharis, i. 366	alcohol, i. 607
collodium, i. 131	vinum, i. 587
creasotum, i. 628	vid. Typhus.
emetics, ii. 333 ferrum, i. 406, 407	typhoid, alumen, i. 158 angustura, i. 484
frigus, ii. 182	argenti nitras, i. 310
hydrargyrum, ii. 691	camphora, ii. 65
iodinium, ii. 747	cantharis, i. 358, 362
ol. terebinthine, i. 622	chloroformum, ii. 124
Eustachian tube, catarrh of, hydrargyrum, ii.	cinchona, i. 453
694 Exercistions sleebel i 611	frigus, ii. 176
Excoriations, alcohol, i. 611 cetaceum, i. 122	hydrargyrum, ii. 668 liquor sodæ chlorinatæ, i. 252
oleum cacao. i. 127	ol. terebinthinæ, i. 619
sevum, i. 127	opium, i. 683
zinci carbonas præcipitatus, i. 196	potassæ chloras, ii. 781
Experience in therapeutics, i. 22	rheum, ii. 425
Eye, to dilate pupil of, belladonna, ii. 736	yellow, cinchona, i. 443
hyoscyamus, i. 720 Eyes, inflammation of, glycerina, i. 126	hydrargyrum, ii. 670 ol. terebinthinæ, i. 618
hydrargyrum, ii. 690	plumbum, i. 190
plumbum, i. 193	Fevers, acidum aceticum, i. 238, 240
nervous debility of, aqua ammoniæ, i. 275	alcohol, i. 607
rosmarinus, i. 519	ammonise muries, ii. 785
7	cantharis, i. 361
FAUCES, chronic inflammation of, aqua am-	digitalis, ii. 237
moniæ, i. 275 argenti nitras, i. 316	emetics, ii. 331 frigus, ii. 175
Favus, acidum aceticum, i. 241	opium, i. 681
sulphurosum, i. 266	vinum, i. 587
Fever, cathartics, ii. 388	Fevers, eruptive, antimonii et potassee tartras
liquor potasses citratis, ii. 498	ii. 350
spiritus etheris nitrosi, ii. 136, 500	cantharis, i. 363
Fever, bilious, hydrargyrum, ii. 672	opium, i. 684
hectic, cinchona, i. 456 intermittent, acidum nitricum, i. 243	Fissures, aloe, il. 446 glycerina, i. 124
acidum tannicum, i. 201	sinci oxidum, ii. 141
alumen, i. 158	Fistula in ano, iodinium, ii. 754
ammonise murias, ii. 785	Flatulence, anisum, i. 495
angustura, i. 483	aurantii cortex, i. 490

Fluxes, chronic, alcohol, i. 609	Gout-
Fractures, amylum, i. 110	colchicum, ii. 570
plumbum, i. 195	
ununited, potassa, i. 282	frigus, ii. 183
Frost-bite, acid. muriaticum, i. 262	gentiana, i. 471 guniacum, ii. 504
aqua ammoniæ, i. 275	iodinium, ii. 744
calx chlorinata, i. 256	moschus, ii. 51
hot water, i. 552	opium, i. 706
ol. terebinthinæ, i. 622	sabina, i. 348
Furor uterinus, camphora, ii. 69	soda, i. 292
z aror asorinas, campacia, in co	succinum, ii. 32
GALACTORRHŒA, belladonna, i. 738	valeriana, ii. 40
Gangrene, acid. nitric., i. 246	vapor-bath, i. 548
acid, sulphurie, i. 266	Granulations, exuberant, alumen, i. 131
brominium, ii. 759	Gravel, acid, magnesia, ii. 401
ealx chlorinata, i. 256	calx, i. 303
camphora, ii. 71	opium, i. 703
cantharis, i. 367	potassa, i. 283
cinchona, i. 457	Gums, ulcerated, alumen, i. 160
creasotum, i. 628	myrrha, ii. 480
dry, aconitum, ii. 261	potassæ chloras, ii. 777
ol. terebinthinæ, i. 623	wasting of, iodinium, ii. 749
opium, i. 686	wasting of, routerain, in 140
of lungs, ol. terebinthinse, i. 621	HEMATURIA, acidum gallicum, i. 204
of mouth, creasotum, i. 628	Hæmoptysis, acidum gallicum, i. 204
cupri sulphas, i. 327	acidum tannicum, i. 201
Gastralgia, acid. hydrocyanic. dilut., ii. 214	cantharis, 361
alumen, i. 155	frigus, ii. 185
argenti nitras, i. 308	ipecacuanha, ii. 370
bismuthi subnitras, i. 166	plumbum, i. 187
mentha piperita, i. 512	Hæmorrhoids, acid. nitric., i. 246
nux vomica, ii. 154	acid. tannic., i. 202
opium, i. 695	aloe, ii. 445
Gastro-intestinal irritation, acacia, i. 99	capsicum, i. 338
Genital organs, excitement of, brominium,	copaiba, ii. 555
ii. 760	millefolium, i. 487
humulus, i. 758	piper, i. 517
Glands, enlarged, ammoniæ carbonas, i. 636	pix liquida, ii. 488
ammoniæ murias, ii. 786	1
brominium, ii. 759	potassæ bitartras, ii. 407
iodinium, ii. 738, 749	tartras, ii. 406
	quercus, i. 217
Gleet, aloe, ii. 446	rheum, ii. 425
ammoniæ murias, ii. 786 cantharis, i. 367	stramonium, i. 753
	sulphur, ii. 399
creasotum, i. 628	Hair, to remove, calx, i. 300
oupri sulphas, i. 328	Hallucinations, cannabis Indica, i. 774
ergota, ii. 599	Hay fever, nux vomica, ii 154
iodinium, ii. 748	Head, affections of, cantharis, i. 363
Glottis, spasm of, moschus, ii. 51	Headache, acetum, i. 241
Goitre, sinmonia murias, ii. 786	ammonise carbonas, i. 635
hydrargyrum, ii. 682	anthemis, i. 479
iodinium, ii. 738	arsenicum, ii. 711
Godorbean argenti pitras i 322	asarum, ii. 322
Gonorrhea, argenti nitras, i. 322	liquor ammoniæ acetatis, ii. 497
balsam. peruvianum, ii. 482	magnesia, ii. 401
bismuthi subnitras, i. 168	nervous, æther, ii. 75, 78
cantharis, i. 359	opium, i. 693
colocynthis, ii. 430	Heart, disease of, aconitum, ii. 261
copaiba, ii. 552	digitalis, ii. 237, 242
cubeba, ii. 559	veratria, ii. 316
cupri sulphas, i. 328	veratrum viride, ii. 249
jalapa, ii. 433	hypertrophy of, plumbum, i. 188
opium, i. 704	organic disease of, ferrum, i. 399
zinci acetas, i. 195	palpitation of, argenti nitras, i. 310
sulphas, ii. 336	cinchona, i. 446
Gout, aconitum, ii. 260	prunus, i. 465
ammoniæ carbonas, i. 635	valeriana, ii. 40
phosphas, ii. 527	zinci sulphas, ii. 338
calx, i. 304	Hemorrhage, acid. aceticum, i. 240
camphora, ii. 68	gallicum, i. 204
cantharia, i. 367	sulphurioum, i. 267
cinchona, i. 452	tannicum, i. 200

Hemorrhage-	Housemaid's knee, ammonize murias, ii. 787
actual cautery, i. 542	Hydatids of uterus, ergota, ii. 598
after labor, frigus, ii. 185	Hydrarthrosis, iodinium, ii. 750, 751
alcohol, i. 611 alumen, i. 154, 158	Hydrocele, cantharis, i. 361 digitalis, 236
catechu, i. 206	iodinium, ii. 750
cinchona, i. 457	scilla, ii. 534
creasotum, i. 626	vinum, i. 589
digitalis, ii. 239	Hydrocephalus, antimonii et potasse tartra
electricity, i. 577	ii. 357
ergota, ii. 597	hydrargyrum, ii. 675
ferrum, i. 398, 408 frigus, ii. 185	iodinium, ii. 743, 753 Hydrophobia, cantharis, i. 369
from bladder, zinci sulphas, ii. 337	Hyoseyamus, poisoning by, opium, i. 720
hyosoyamus, i. 720	Hypertrophy, brominium, ii. 759
ipecacuanha, ii. 369	Hypochondriasis, assasætida, ii. 28
krameria, i. 213	hyoscyamus, i. 719
oleum terebinthinæ, i. 616	Hypodermic method, i. 61
opium, i. 686	Hysteria, æther, ii. 75, 97
plumbum, i. 186	allium, ii. 475
potassæ nitras, ii. 523	assafætida, ii. 28
pulmonary, antimonii et potasse tartras, ii. 356	camphora, ii. 69 castoreum, ii. 44
pulvis ipecacuanhæ compositus, ii. 501	electricity, i. 570
quercus, i. 216	frigus, ii. 188
uterine, cinnamomum, i. 499	moschus, ii. 50
electricity, i. 572	spiritus setheris nitrosi, ii. 136
ergota, ii. 596	valeriana, ii. 38
Hepatitis, acute, hydrargyrum, ii. 679	
chronic, hydrargyrum, ii. 680	ICHTHYOSIS, oleum morrhum, ii. 769
Hernia, æther, ii. 78	Ileus, hydrargyrum, ii. 688
antimonii et pota sse tartras, ii. 359 frigus, ii. 195	tabacum, ii. 304
iodinium, ii. 750	Impetigo, soidum nitricum. i. 245 Impotence, electricity. i. 571
potassa, i. 281	nux vomica, ii. 152
strangulated, belladonna, i. 733	sexual, cantharis, i. 369
tabacum, ii. 304	Infection, calx chlorinata, i. 258
umbilical, collodium, i. 132	Inflammation, alcohol, i. 607
Herpes circinatus, pix liquida, ii. 488	ammonise murias, ii. 786
Hicoup, sether, ii. 75	antimonii et potassæ turtras, ii. 350
cinchona, i. 446	bath, warm, i. 550
moschus, ii. 50 ol. cajuputi, i. 497	camphora, ii. 67 digitalis, ii. 239
saccharum, i. 143	emetics, ii. 332
tabacum, ii. 301	frigus, ii. 181
Hoarseness, acidum nitricum, i. 244	hydrargyrum, ii. 673
Hooping-cough, acidum hydrocyanicum dilu-	opium, i. 685
tum, ii. 213	plumbum, i. 192
acidum nitricum, i. 244	potassa, i. 284
acidum tannicum, i. 200	pulvis ipecacuanha compositus, ii. 501
allium, ii. 476	Influenza, supatorium, i. 481
alumen, i. 157 ammoniæ murias, ii. 786	vid. Bronchitis. Inhalation of medicines, i. 63
antimonii et potasem tartras, ii. 357	Inoculation of medicines, i. 61
aqua ammonia, i. 276	Insanity, acid. hydrocyanic. dilutum, ii. 214
argenti nitras, i. 317	antimonii et potassæ tartras, ii. 358
assafœtida, ii. 28	camphora, ii. 70
belladonna, i. 733	chloroformum, ii., 126
brominium, ii. 759	colocynthis, ii. 430
chloroformum, ii. 125	conium, ii. 274
cinchons, i. 456	ferrum, i. 400
conium, ii. 275 dracontium, ii. 31	frigus, ii. 187 helleborus, ii. 457
ergota, ii. 600	opium, i. 688
etherization, ii. 98	stramonium, i. 747
ferrum, i. 401	valeriana, ii. 40
ipecacuanha, ii. 366	warm bath, i. 551
lobelia, ii. 283	Insomnia, vid. Sleeplessness.
potasse carbonas, ii. 518	Intermittent diseases, cinchona, i. 439
stramonium, i 752	Intertrigo, bismuthi subnitras, i. 169
valeriana, ii. 40	salvia, i. 525
zinci sulphas, ii. 338	zinci carbonas præcipitatus, i. 196

```
Intestine, perforation of, opium, i. 700
Intoxication, alcoholic, acetum, i. 239
         ammonise carbonas, i. 634
         aqua ammonise, i. 277
         liquor ammoniæ acetatis, ii. 497
Iris, hernia of, belladonna, i. 737
Iritis, belladonna, i. 737
    hydrargyrum, ii. 683
    ol. terebinthinæ, 621
Issues, to form, calx, i. 301
JAUNDICE, acidum nitricum, i. 245
    aloe, ii. 445
    argenti nitras, i. 310
    benzoinum, ii. 485
    hydrargyrum, ii. 682
    podophyllum, ii. 465
    potassæ acetas, ii. 525
    potassæ carbonas, ii. 518
    potassæ chloras, ii. 781
Joints, affections of, moxa, i. 544
     hysterical rigidity of, chloroformum, ii.
       129
KIDNEYS, inflammation of, warm bath, i. 551
LABOR, difficult, antimonii et potasse tartras,
       ii. 359
     æther, ii. 94
     chloroformum, ii. 118
     ergota, ii. 590
     gossypii radix, ii. 602
Lactation, excessive, iodinium, ii. 746
Lacteals, absorption by, i. 47
Laryngismus stridulus, oleum morrhuæ, ii. 722
     cinchona, i. 446
Laryngitis, antimonii et potasse tart., ii. 355
     balsamum Peruvianum, ii. 481
     belladonna, i. 734
     chronic, argenti nitras, i. 313, 316
         saccharum, i. 143
     glycerina, i. 123
     hydrargyrum, ii. 685
     iodinium, ii. 748
     ipecacuanha, ii. 366
     oleum tiglii, ii. 454
     pseudomembranous, alumen, i. 155
     subacute, argenti nitras, i. 316
Larynx, chronic inflammation of, hydrargy-
  rum, ii. 694
Lead, elimination of, iodinium, ii. 734
     colic, acid. sulphuric., i. 268
     poisoning, acid. sulphuric., i. 268
Leucorrhœa, acid. tannic., i. 202
     aloë, ii. 446
     alumen, i. 161
     ammoniæ murias, ii. 786
     aqua ammoniæ, i. 275
     argenti nitras, i. 323
     arsenicum, ii. 716
     balsamum peruvianum, ii. 482
     bismuthi subnitras, i. 168
     calx, i. 301
     cantharis, i. 367
     copaiha, ii. 554
     creasotum, i. 628
     cubeba, ii. 560
     cupri sulphas, i. 329
     ergota, ii. 598
     ferrum, i. 408
     granatum, ii. 618
     hydrargyrum, ii. 691
```

```
| Leucorrhœa-
     iodinium, il. 746, 748
     kino, i. 212
     plumbum, i. 193
     potassæ chloras, ii. 782
     quercus, i. 217
     zinci sulphas, ii. 336
 Lice, to destroy, cocculus, ii. 279
     colchicum, ii. 576
 Lithiasis, ammoniæ carbonas, i. 636
     ammoniæ phosphas, ii. 528
     benzoinum, ii. 484
     calx, i. 303
     magnesia, ii. 401
     potassa, i. 283
     potassæ carbonas, ii. 517
     soda, i. 290
     sodæ boras, i. 297
 Liver, disorder of, acidum nitricum, i. 245
          acidum nitro-muriaticum, i. 263
          potasse acetas, il. 525
          sodæ carbonas, i. 293
          taraxacum, ii. 539
          hydrargyrum, ii. 680
 Local pains, congelation, ii. 198
 Lumbago, hydrargyrum, ii. 689
     iodinium, ii. 745
 Lungs, chronic affections of, creasotum, i. 627
     diseases of, aconitum, ii. 261
      inflammation of, cantharis, i. 364
 Lupus, arsenicum, ii. 718
     iodinium, ii. 748
      oleum morrhuæ, ii. 768
 MALARIA, prophylactic against, cinchona, i.
 Malarial affections, cinchona, i. 445
 Malarious cachexia, potassa acetas, ii. 526
 Mamma, abscess of, antimonii et potassæ tar-
            tras, ii. 356
          iodinium, ii. 749
     tumor of, plumbum, i. 194
 Mania, sether, ii. 76, 99
     cantharis, i. 369
     hyoscyamus, i. 719
      puerperal, veratrum viride, ii. 250
 Mania-à-potu, antimonii et potasse tartras, ii.
        358
     vid. Delirium tremens.
      vid. Insanity.
 Measles, adeps, i. 117
 Medicines, absorption of, i. 40, 42
      action of, in health and disease, i. 33
      administration of, i. 83
     changes after absorption, i. 66
     classification of, i. 91
      curative action of, i. 67
      defined, i. 17
      detected in fluids and solids, i. 42
      differences of, i. 19
      doses of, i. 89
      effects modified by composition, form,
        dose, application, &c., i. 76
      effects modified by peculiarities of the
        patient, ii. 77
      effects modified by race, age, sex, habit,
        idiosyncrasy, &c., i. 81
      forms of, i. 83
      given by mouth, i. 55
      influences modifying effects of, i. 75
      inhalation of, i. 63
```

introduced by rectum, i. 54

Medicines-	Needle in the flesh, electricity, i. 577
introduced by skin, i. 56	Nephritic disorders, chimaphila, ii. 547
by stomach, i. 52	vid. Lithiasis.
by veins, i. 51	Nervous atony, valeriana, ii. 40
local action of, i. 36 penetration of, i. 39	debility, cubeba, ii. 560 excitability, opium, i. 686
primary action of, i. 68	exhaustion, frigus, ii. 186
remote action of, i. 38	vomiting, oleum cajuputi, i. 497
sources of, i. 19	Nervous system, diseases of, emetics, ii. 333
sources of knowledge respecting, i. 27	Nervousness, castoreum, ii. 44
specific action of, i. 69	valeriana, ii. 39
sympathy in action of, i. 41	Neuralgia, acid. hydrocyanic. dilut., ii. 214
the art of prescribing, i. 87	aconitum, il. 260
Meningitis, antimonii et potassæ tartras, ii. 357	ether, ii. 78, 97
cerebro-spinal, cinchona, i. 453 etherization, ii. 99	aqua ammonise, i. 274 arsenicum, ii. 715
opium, i. 690	assafœtida, ii. 28
hydrargyrum, ii. 675	belladonna, i. 728
oleum tiglii, ii. 453	cannabis Indica, i. 774
Menorrhagia, i. 499	cantharis, i. 368
scidum gallicum, i. 208	chloroformum, ii. 127, 129, 130
aloe, ii. 446	oinchona, i. 447
arsenioum, ii. 716	colchicum, ii. 575
cannabis Indica, i. 775	conium, ii. 274
cinchona, i. 457	creasotum, i. 627
cinnamomum, i. 499 digitalis, ii. 239	electricity, i. 569 ferrum, i. 399
ergota, ii. 596	hyoscyamus, i. 719
erigeron, ii. 541	iodinium, ii. 745
frigus, ii. 185	nux vomica, ii. 154
ipecacuanha, ii. 369	oleum monardæ punctatæ, i. 349
krameria, i. 213	oleum tiglii, ii. 454
liquor ammoniæ acetatis, ii. 497	opium, i. 692
millefolium, i. 488	plumbum, i. 192
plumbum, i. 186	potassæ chloras, ii. 780
ruta, i. 522	stramonium, i. 752
sabina, i. 347 sodæ boras, i. 297	valeriana, ii. 40 veratria, ii. 314
Menses, suppressed, aqua ammonise, i. 275	zinci valerianas, ii. 141
vid. Amenorrhoea.	Neuroses, cinchons, i. 446
disordered, ferrum, i. 395, 398	Night-blindness, oleum morrhuse, ii. 772
scanty, sodæ boras, i. 297	nux vomics, ii. 151
Mercury, elimination of, iodinium, ii. 734	Nipples, sore, acidum tannicum, i. 201
Metritis, hydrargyrum, ii. 683	alcohol, i. 611
Midwifery, chloroformum, ii. 118	argenti nitras, i. 321
etherization, ii. 92	benzoinum, ii. 485
Milk, excessive secretion of, belladonna, i. 738 camphora, ii. 72	catechu, i. 206
iodinium, ii. 746	copaiba, ii. 556 ferrum, i. 408
scanty secretion of, funiculum, i. 505	glycerina, i. 124
electricity, i. 573	krameria, i. 215
ricinus, il. 418	mel, i. 137
salvia, i. 524	pix liquida, ii. 488
Milk fever, oleum ricini, ii. 418	Nitrate of silver stains, iodinium, ii. 748
Mouth, medicines given by, i. 55	Nodosity of the joints, arsenicum, ii. 714
Mucous discharges, calx, i. 301	iodinium, ii. 744
fluxes, chronic, ferrum, i. 402	Nymphomania, brominium, ii. 760
membranes, relaxed, alumen, i. 161 Mushrooms, poisoning by, sether, ii. 77	camphora, ii. 69 conium, ii. 274
tabacum, ii. 306	Contain, II. 213
	OBSTRUCTION of bowels, magnesim sulphas, if
Nævus, antimonii et potasse tartras, ii. 359	404
calx, i. 300	nux vomica, ii. 155
collodium, i. 132	Œsophagus, foreign bodies in, antimonii e
creasotum, i. 629	potasse tartras, ii. 359
sinci chloridum, i. 829	spasm of, nux vomica, ii. 153
Nail, in-grown, alumen, i. 161	Odors, fetid, plumbum, i. 193
ferrum, i. 408	Ophthalmia, alumen, i. 159
potassa, i. 282 Narcotic poisoning, alumen, i. 156	argenti nitras, i. 318 calx chlorinata, i. 255
camphora, ii. 71	cantharis, i. 363
Nature, in curing disease, i. 23	cinchona, i. 456
· · · · · · · · · · · · · · · · · · ·	-

Or.hthelmia	Peritonitis—
Ophthalmia— cupri sulphas, i. 327	iodinium, ii. 750
ferrum, i. 410	oleum terebinthinæ, i. 617
hydrargyrum, ii. 690	opium, i. 700, 702
iodinium, ii. 749	Perspiration, excessive, saliva, i. 524
oleum morrhuæ, ii. 766	Pharyngitis, ammonia murias, ii. 787
opium, i. 706	follicular, argenti nitras, i. 316 iodinium, ii. 749
plumbum, i. 193 sassafras medulla, i. 106	Pharynx, mucous flux of, cinchona, i. 457
zinci acetas, i. 195	spasm of, moschus, ii. 50
oxidum, ii. 141	Phimosis, belladonna, i. 732
sulphas, ii. 336	Phlebitis, antimonii et potassæ tartras, ii. 356
Opium, poisoning by, belladonna, i. 742	cantharis, i. 366
cuffee, i. 708	ferrum, i. 407 Phlegmasia alba, cantharis, i. 366
cold affusion, i. 709 electricity, i. 709	Phosphatic urine, benzoinum, ii. 484
stramonium, i. 754	Photophobia, belladonna, i. 738
Organs, elective action of medicines for va-	
rious, i. 70	conium, ii. 275
Osteitis, oleum morrhuæ, ii. 767	electricity, i. 569
Otalgia, æther, ii. 78	Phthisis, acidum tannicum, i. 199
Otorrhœa, argenti nitras, i. 322 Ovary, cysts of, iodinum, ii. 753	adeps, i. 117 alcohol, i. 609
Ozena, argenti nitras, i. 319	cantharis, i. 365, 366
bismuthi subnitras, i. 169	chlorinium, i. 248
calx chlorinata, i. 259	cinchona, i. 456
hydrargyrum, ii. 690	digitalis, ii. 240
iodinium, ii. 747, 748, 749	dry heat, i. 540
krameria, i. 215 plumbum, i. 193	ferrum, i. 403
prumvam, 1. 180	glycerina, i. 123 iodinium, ii. 740
PAIN, opium. i. 687	oleum morrhuæ, ii. 769
local, æther, ii. 92	phosphorus, i. 643
belladonna, i. 730	pix abietis, i. 339
chloroformum, ii. 129	plumbum, i. 191
frigus, ii. 196 Palpitation of the heart, veratrum viride, ii.	prunus, i. 465 taraxacum, ii. 540
249; vid. Heart.	Plethora, cathartics, ii. 388
Paralysis, argenti nitras, i. 311	Pleurisy, cantharis, i. 364
arnica, i. 639	hydrargyrum, ii. 677
aesafætida, ii. 30	iodinium, ii. 749, 752
cantharis, i. 369	oleum morrhuse ii. 772
cinchona, i. 448° colocynthis, ii. 430	opium, i. 694 pix abietis i. 340
electricity, i. 563, 566, 567	veratrum viride, ii. 248
erguta, ii. 599	Pneumonia, acid. hydrocyanic. dilut., ii. 214
iodinium, ii. 745	ammoniæ carbonas, i.633
moxa, i. 544	antimonii et potassee tartras, ii. 350
mucuna, ii. 606	cantharis, i. 364
nux vomica, ii. 149 oleum cajuputi, i. 497	chloroformum, ii. 124 cinchona, i. 456
oleum morrhuæ, ii. 772	eupatorium, i. 482
pyrethrum, i. 345	hydrargyrum, ii. 678
succinum, ii. 302	ipecacuanha, ii. 366
valerinna, ii. 46	moschus, ii. 49
vapor bath, i. 548	opium, i. 694
warm bath, i. 551 zingiber, i. 528	potassæ nitras, ii. 523 senega, ii. 471
Paraphimosis, belladonna, i. 732	veratria, ii. 315
Paraplegia, belladonna, i. 736	veratrum viride, ii. 248
toxicodendron, i. 642	Poisoning by seid. hydrocyanic., cold water
Paronychia, frigus, ii. 193	ii. 216
hydrargyrum, ii. 691	alkalies, acid. acetic., i, 239
opium, i. 707	arsenic, ferrum, i. 407; ii. 719
potassa, i. 282 Pericarditis, cantharis, i. 366	magnesiæ, ii. 401 bites of insects, &c., aqua ammoniæ,
hydrargyrum, ii. 676	277
Periodical affections, action of cinchona in	
curing, i. 440	iodine, amylum, i. 110
arsenicum, ii. 709	narcotics, acid. acetic., i. 239
cinchona, i. 439	alcohol, i. 610
Peritonitis, hydrargyrum, ii. 677	alumen, i. 156

```
Poisoning by narcotics—
                                                  Rheumatism—
          frigus, ii. 188
                                                      oleum morrhuæ, ii. 764
          sinapis, i. 334
                                                      oleum terebinthinæ, i. 620, 621
          zinci sulphas, ii. 337
                                                      oleum tiglii, ii. 454
     phosphorus, magnesia, ii. 402
                                                      opium, i. 705
     prussic acid, aqua ammonise, i. 276
                                                      pix abietis, i. 339
     strychnia, tabacum, ii. 303
                                                      potassa acetas, ii. 526
     venomous serpents, &c., oleum oliva, ii.
                                                      potasse nitras, ii. 522
                                                      pulvis ipecacuanhæ compositus, ii. 501
Pollutions, nocturnal, copaiba, ii. 556; vid.
                                                      rosmarinus, i. 519
   Spermatorrhosa.
                                                      sanguinaria, ii. 373
Polypi, ferrum, i. 408
                                                      sinapis, i. 335
     sanguinaria, ii. 373
                                                      soda, i. 293
     zinci sulphas, ii. 337
                                                      stramonium, i. 753
Powder grains in skin, hydrargyrum, ii. 695
                                                      succinum, ii. 32
Priapism, camphora, ii 71
                                                      sulphur, ii. 399
     humulus, i. 758
                                                      vapor bath, i. 548
Prolapsus of rectum, nux vomica, ii. 151
                                                      veratria, ii. 315
     acidum tannicum, i. 202
                                                      veratrum viride, ii. 249
Prurigo, acidum sulphuricum, i. 267
                                                      warm bath, i. 551
     colchicum, ii. 575
                                                 Ring, gold, to remove from finger, hydrargy-
    creasotum, i. 629
                                                   rum, ii. 694
    pix liquida, ii. 488
     pudendi, hydrargyrum, ii. 593
                                                 Salivation, argenti nitras, i. 322
Pruritus, arsenicum, ii. 716
                                                      calx chlorinata, i. 259
    vulvæ, glycerina, i. 125
                                                      iodinium, ii. 749
         soda, i. 293
                                                      plumbum, i. 194
         veratrum album, ii. 310
                                                      in pregnancy, iodinium, ii. 746
                                                      acidum nitricum, i. 245
Psoriasis, acid. tannic., i. 202
                                                          antimonise et potasses tartras, ii. 357
    arsenicum, ii. 712
    cantharia, i. 358
                                                          iodinium, ji. 734
    copaiba, ii. 556
                                                          potasse chloras, ii. 776, 777
    pix liquida, ii. 488
                                                 Satyriasis, brominium, ii. 760
Ptyalism, alumen, i. 161
                                                      camphora, ii. 69
                                                      conium, ii. 274
Puerperal mania, camphora, ii. 70
Pupil, to dilate, belladonna, i. 736
                                                 Scabies, acidum sulphuricum, i. 267
Purpura, acidum gallicum, i. 204
                                                      calz chlorinata, i. 257
    oleum terebinthinæ, i. 617
                                                      camphora, ii. 72
Purulent absorption, soid. tannic., i. 201
                                                     pix liquida, ii. 488
Pyrosis, acidum gallicum, i. 205
                                                     sabadilla, ii. 311
    kino, i. 211
                                                     sinapis, i. 335
                                                     sulphur, ii. 397
RACHITIS, calx, i. 304
                                                 Scalds, frigus, ii. 194
    oleum morrhuse, ii. 768
                                                 Scarlatina, adeps, i. 117
Rectum, cinchona administered by, i. 458
                                                     ammonise carbonas, i. 633
    medicines introd. by, i. 54
                                                     capsicum, i. 338
    prolapsed, quereus, i. 217
                                                     belladonna, i. 739
         nux vomica, ii. 151
                                                     chlorinium, i. 248
Rheumatism, aconitum, ii. 258
                                                     colchicum, ii. 574
    ammoniæ carbonas, i. 634, 635
                                                     frigus, ii. 178
         phosphas ii. 527
                                                     potassæ chloras, ii. 781
    ammoniacum, ii. 477
                                                 Sciatica, aconitum, ii. 261
    antimonii et potassæ tartras, ii. 356
                                                     belladonna, i. 729
                                                     cantharis, i. 368
    arsenicum, ii. 714
                                                     iodinium, ii. 745
    camphora, ii. 72
    cannabis Indica, i. 774
                                                     moxa, i. 544
                                                     ol. terebinthinæ, i. 620
    cantharis, i. 367
    capsicum, i. 338
                                                     oleum tiglii, ii. 454
    chimaphila, ii. 547
                                                     pix abietis, i. 340
                                                 Scirrhus, iodinium, ii. 740
    cimicifuga, ii. 473
                                                 Scrofula, acidum nitricum, 1. 245
    cinchona, i. 448
    colchicum, ii. 572
                                                     calz chlorinata, i. 257
    conium, ii. 274
                                                     cantharis, i. 370
    creasotum, i. 627
                                                     chimaphila, ii. 547
                                                     cinchona, i. 455
    dulcamara, i. 764
    frigus, ii. 183
                                                     conium, ii. 272
    guaiacum, ii. 504
                                                     digitalis, ii. 241
    hydrargyrum, ii. 678
                                                     dry heat, i. 540
    iodinium, ii. 744
                                                     dulcamara, i. 765
                                                     ferrum, i. 405
    limonis succus, ii. 220
                                                     frigus, ii. 184
    liquor ammoniæ acetatis, ii. 497
    monarda, i. 349, 513
                                                     humulus, i. 757
```

Syphilis—	Tumors—
hydrargyrum, ii. 660	conium, ii. 272
iodinium. ii. 735	of bureæ, iodinium, ii. 751
mezereum, i. 343	of uterus, ergota, ii. 598
opium, i. 703	soda, i. 293
sarsaparilla, ii. 790	varicose, potassa, i. 283
M 1 166	vascular, acidum tannicum, i. 202
TABES mesenterica, oleum morrhuse, ii. 166	Tympanitis, aqua ammonise, i. 276
Tania, sether, ii. 77	assafœtida, ii. 29
brayera, ii. 621	calx, i. 302
filix mas, ii. 609	ol. terebinthinæ, i. 622 plumbum, i. 191
granatum, ii. 617 kamela, ii. 627	Typhoid fever, liquor ammonise acetatis,
oleum tiglii, ii. 453	ii. 497; vid. Fever.
pepo, ii. 625	veratrum viride, ii. 249
stanni pulvis, ii. 607	zinci sulphas, ii. 338
Testicle, swelled, collodium, i. 132	state, acidum sulphuricum, i. 267
emetics, ii. 333	angelica, i. 492
Tetanus, aconitum, ii. 262	arnica, i. 639
actual cautery, i. 542	serpentaria, ij. 507
sether, ii. 75, 97	Typhous affections, æther, ii. 76
alcohol, i. 611	Typhus, acidum muriaticum, i. 261
allium, ii. 475	acidum nitricum, i. 243
antimonii et potassæ tartras, ii. 357	alcohol, i. 606
belladonna, i. 735	ammoniæ carbonas, i. 632
cannabis Indica, i. 773	antimonii et potassæ tartras, ii. 349
cantharis, i. 369	calx chlorinata, i. 255
chloroformum, ii. 125	camphora, ii. 65
cinchona, i. 447	cantharis, i. 362
conium, ii. 275	chlorinium, i. 248
ferrum, i. 400 frigus, ii. 189	cinchona, i. 452 frigus, ii. 177
moschus, ii. 50	liquor ammonia acetatis, ii. 497
nux vomica, ii. 152	oleum monardæ punotatæ, i. 349
opium, i. 691	opium, i. 682
potassa, i. 283	serpentaria, ii. 507
tabacum, ii. 302	
vinum, i. 589	ULCER of rectum, granatum, ii. 618
Therapeutics, deductive study of, i. 29	of uterus, potassæ chloras, ii. 782
defined, i. 18	Ulcers, acidum sulphuricum, i. 266
experiments on animals to illustrate, i. 34 inductive study of, i. 29	actual cautery, i. 542 alcohol, i. 611
laws of, i. 22	alco, ii. 446
numerical method in, i. 29	argenti nitras, i. 320
sources of knowledge in, i. 20	balsamum peruvianum, ii. 482
Tinea capitis, acidum sulphuricum, i. 266	benzoinum, ii. 485
calx chlorinata, i. 256	bismuthi subnitras, i. 169
oleum morrhuæ, ii. 769	calx chlorinata, i. 256
Tinnitus aurium, sether, ii. 78	camphora, ii. 71
chloroformum, ii. 130	cantharis, i. 361, 367
Tongue, paralysis of, asarum, ii. 322	carota, ii. 536
Tonsillitis, alumen, i. 159	collodium, i. 130
antimonii et potassæ tartras, ii. 356	conium, ii. 272
argenti nitras, i. 317 capsioum, i. 338	copaiba, ii. 556 creasotum, i. 628
guaiacum, ii. 505	cupri sulphas, i. 327
salvia, i. 525	electricity, i. 574
Tonsils, ulcers of, iodinium, ii. 749	frigus, ii. 194
Toothache, acidum tannicum, i. 202	glycerina, i. 124
æther, ii. 78	hydrargyrum, ii. 690
alumen, i. 161	kino, i. 212
camphora, ii. 72	liquor sodæ chlorinstæ, i. 252
cantharis, i. 361	mel, i. 137
caryophyllus, i. 502	pix liquida, ii. 488
chloroformum, ii. 130 conia, ii. 275	plumbum, i. 193
creasotum. i. 627	potassa, i. 281 potassa chloras, ii. 782
ol. cajuputi, i. 497	rheum, ii. 426
opium, i. 707	salvia, i. 525
pyrethrum, i. 345	sinci oxidum, ii. 141
Tumors, belladonna. i. 728	sulphas, ii. 337
brominium, ii. 759	Urethra, irritable, in females, subeba, ii. 560

Urethra—	Vomiting—
spasm of, belladonna, i. 731	oxalate of cerium, i. 170
opium, i. 703	Vulva, pruritus of, alumen, i. 161
Uric acid, benzoinum, ii. 484	arsenicum, ii. 716
Urine, incontinence of, belladonna, i. 731	sodæ boras, i. 296
benzoinum, ii. 485	,
buchu, ii. 542	WARTS, acidum aceticum, i. 241
cantharis, i. 359	acid. muriaticum, i. 262
	acidum nitricum, i. 245
nux vomica, ii. 152	ammoniæ murias, ii. 787
ol. terebinthinæ, i. 620	antimonii terchloridium, i. 330
retention of, cantharis, i. 359	
stramonium, i. 752	creasotum, i. 629
spasmodic retention of, ferrum, i. 400	iodinium, ii. 748
Uterine disorders, cathartics, ii. 389	magnesiæ carbonas, ii. 402
hæmorrhage, cinnamomum, i. 499	sanguinaria, ii. 373
electricity, i. 572	Whitlow, frigus, ii. 194
inertia, cinnamomum, i. 499	hydrargyrum, ii. 691
rigidity. antimonii et potassæ tartras, ii.	Whooping-cough; vid. Hooping-cough.
358	Worms, absinthium, ii. 619
belladonna, i. 733	acidum muriaticum, i. 262
Uterus, engorgement of, ergota, ii. 598	allium, ii. 475
engorged, frigus, ii. 196	azedarach, ii. 625
inert, sodæ boras, i. 297	camphora, ii. 71
cannabis indica, i. 775	cathartics, ii. 387
electricity, i. 572	cinchona, i. 457
irritable, belladonna, i. 731	chenopodium, ii. 612
cimicifuga, ii. 473	colocynthis, ii. 429
prolapsus of, acid. tannic., i. 202	creasotum, i. 627
relaxed, uva ursi, ii. 545	ferrum, i. 403
to promote contraction of, cinnamomum,	gambogia, ii. 439
i. 499	helleborus, ii. 457
electricity, i. 572	hydrargyrum, ii. 688
ergota, ii. 590	jalapa, ii. 433
oleum terebinthinæ, i. 920	mucuna, ii. 606
*************	nux vomica, ii. 156
VARICOCELE, collodium, i. 132	oleum ricini, ii. 417
Variola, acidum tannicum, i. 201	ol. terebinthinæ, i. 619
argenti nitras, i. 321	quassia, i. 474
camphora, ii. 72	sabadilla, ii. 312
cinchona, i. 455	sabina, i. 348
collodium, i. 131	santonica, ii. 614
hydrargyrum, ii. 692	spigelin, ii. 623
iodinium, ii. 747	stanni pulvis, ii. 607
Veins, absorption by, i. 47	tanacetum, ii. 615
medicines introduced by, i. 51	valeriana, ii. 42
varicose, ferrum, i. 409	Wounds, actual cautery, i. 542
Vertigo, cubeba, ii. 560	ammoniæ murias, ii. 786
nervous, zinci valerianas, ii. 141	balsam, peruvianum, ii. 482
Vesical irritation, lenitives, i. 97	l
Vesication by mezereum, i. 343	collodium, i. 130
	dry heat, i. 541
Vomiting, alcohol, i. 611	frigus, ii. 192
belladonna, i. 736	glycerina, i. 124
calx, i. 302	myrrha, ii. 480
creasotum, i. 626	poisoned, acidum nitricum, i. 245
iodinium, ii. 746	acidum sulphuricum, i. 266
magnesia, ii. 401	antimonii terchloridum, i. 330
nux vomica, ii. 154	iodinium, ii. 750
opium, i 695	i potasso i 282

ERRATA.

```
Vol. I. page 108, after "ULMUS," insert "FULVA."
```

- " 114, for "Jatropha," read "Janipha."
- " 195, for "Pracipitatus," read "Pracipitata."
- " 207, for "GALLS," read "NUTGALL."
- " 294, for "BORAX," read "BORATE OF SODA.".
- " 298, for "Liquor Calcis," read "Aqua Calcis."
- " for "Lime Water," read "Solution of Lime."
- " 339, for "ABIETIS," read "BURGUNDICA."
- " 344, for "Anthemis," read "Anacyclus."
- " 496, for "CANADA SNAKEROUT," read "WILD GINGER."

					•
•			•	•	
•					
-				•	
	•		4		
					•
				•	
		•		•	·





LANE MEDICAL LIBRARY

This book should be returned on or before the date last stamped below.

<u> </u>	
	•

